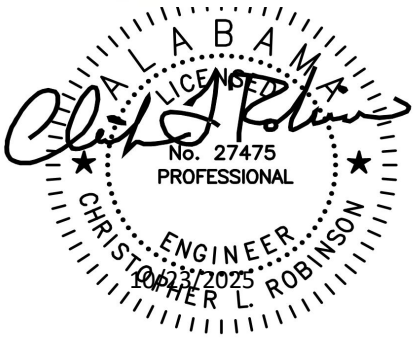
10-23-2025



ARCHITECT'S JOB NO. 25-33

DATED: October 23, 2025

PSCA NO: 9594

NEW GYMNASIUM ADDITION TO
MONTEVALLO HIGH SCHOOL

OWNER
SHELBY COUNTY BOARD OF EDUCATION
P.O. BOX 1910
COLUMBIANA, AL 35051

SCHOOL BOARD MEMBERS

MR. DAVID BOBO	**BOARD PRESIDENT**
MRS. AMBER POLK	**BOARD VICE PRESIDENT**
MRS. PEG HILL	**BOARD MEMBER**
MR. BILLY HOLLIDAY	**BOARD MEMBER**
DR. JIJI DAVIS	**BOARD MEMBER**

DR. LEWIS BROOKS	**Superintendent**

LATHAN · McKEE
ARCHITECTS

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NEW GYMNASIUM TO MONTEVALLO HIGH SCHOOL
Architect's No. 25-33

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NOTE: This Index is for convenience only. Its accuracy and completeness are not guaranteed, and it is not to be considered part of the Specifications. In case of discrepancy, the Specifications shall govern. Certain items may be included by means of notes on the Drawings; such items are not necessarily covered in the Specifications. Contractor shall verify all existing conditions and all dimensions at the project site.

TEAM LIST
NEW GYMNASIUM ADDITION TO
MONTEVALLO HIGH SCHOOL
Architect's Job No. 25-33

OWNER:
SHELBY COUNTY BOARD OF EDUCATION
P.O. Box 1910
Columbiana, AL 35051

ARCHITECT:
LATHAN ASSOCIATES ARCHITECTS, P. C.
dba LATHAN McKEE ARCHITECTS
300 Chase Park South, Suite 200
Hoover, AL 35244
Contact: rfi@lathanassociates.com

CIVIL:
TTL, INC.
10 Inverness Center Pkwy #350
Birmingham, Alabama 35242

STRUCTURAL:
STRUCTURAL DESIGN GROUP, INC.
300 Chase Park South Suite 125
Hoover, Alabama 35244

MECHANICAL/ PLUMBING:
DEWBERRY ENGINEERS, INC.
Riverchase Office Plaza #2 Suite 205
Hoover, Alabama 35244

ELECTRICAL:
STEWART ENGINEERING, INC.
P O Box 2233
Anniston, Al 36202

LIST OF DRAWINGS
NEW GYMNASIUM ADDITION TO
MONTEVALLO HIGH SCHOOL
Architect's Job No. 25-33

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E2.1 - MASTER PLAN AND SINGLE LINE DIAGRAM
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QUALIFYING CONDITIONS FOR GENERAL CONTRACTORS:

The following conditions and terms may be required upon Owner's request and it shall be each Contractor's responsibility to ensure that they meet the minimum requirements set forth.

General Contractors wishing to bid on this project shall meet the following minimum provisions regarding responsibility, in addition to all other requirements listed herein: Contractor shall have constructed not less than one project of similar size and complexity within the last five (5) years, with similar costs prorated for construction cost increases and Contractor shall be capable of 100% bonding of materials and 100% bonding of labor. All General Contractors wishing to bid shall have a minimum of five (5) years of experience doing business under the same firm name in which the bids are submitted. Joint venture contracts will not be approved.

Each General Contractor shall submit a list of all educational projects within the last five years and a statement from the Owners certifying faithful performance that construction completion was, or will be, obtained without protracted delay and/or defective work for the project. Full explanation should be submitted for any delayed completion. Inexperienced or non-responsible contractors are precluded from bidding and award.

Each General Contractor shall submit names and qualifications of main construction personnel to be placed on this project. The proposed project superintendent and the project manager shall have a minimum of five (5) years of work experience in their respective positions in managing and constructing projects similar in size, complexity and cost. Resumes of project superintendent and project manager shall be submitted. The Owner reserves the right of approval of the project superintendent.

Equivalent experience and qualifications will be considered where the bidder can demonstrate special management and construction abilities, expert workmen and past experience in constructing similar complex structures of similar size and cost such as hospitals, college buildings, multi-story office buildings, court houses, jails, hotels, etc. No consideration will be given to wood frame, residential projects, parking structures, small one-story strip shopping centers, warehouses and industrial buildings, etc. Under this provision of equivalency, no consideration or award will be given to any contractor whose comparable project value is less than 50% of the value of the project under bid.

Each General Contractor bidding on this project will be required to demonstrate that his major Subcontractors are capable of pre-qualifying under the same conditions stated above.

All personnel required on the job site must at all times be in possession of **state issued** photo identification subject to examination by Owner or their representative. Other security requirements may also be in place and is the responsibility of the General Contractor to abide by all school rules.

The Owner and its representatives shall be the sole judge of the Contractor meeting the requirements set forth. The Owner's decision in determining qualified General Contractors will be final. The Owner reserves the right to act in its best interests in this determination process to waive all technicalities and informalities and to select the best qualified responsible General Contractors who comply with the above stated provisions.

All of the above information shall be required upon the Owner's request and may be considered a condition for award of contract.

ADVERTISEMENT FOR BIDS

Sealed proposals, in duplicate, from Qualified General Contractors will be received by the Awarding Authority: **Shelby County Board of Education**, held at **the Facilities & Maintenance Building, 125 Industrial Parkway, Columbiana, AL 35051**, until **2:00 p.m.** local time, **Thursday, December 4, 2025**, for:

NEW GYMNASIUM ADDITION TO MONTEVALLO HIGH SCHOOL
ARCHITECT JOB NO. 25-33

At such time and place, the bids will be opened and read. Bids that are received via mail and not presented at the bid opening are to be considered non-responsive. It is the responsibility of the bidder to assure that bids are presented at the time of the bid if they choose to mail the bid. Contractors must notify the Awarding Authority if a bid is to be received by mail.

A cashier's check or bid bond payable to **Shelby County Board of Education** in an amount not less than five (5) percent of the amount of the proposal, but in no event more than $10,000.00, must accompany the bidder's proposal for each project. Performance and Payment Bonds and evidence of insurance as required in the bid documents will be required at the signing of the Contract.

Drawings and specifications for the project may be viewed on the Digital Plan Room at Alabama Graphics (algraphicsplanroom.com). Private Jobs with Password. Password is lathan.

Prior to issuance of plans and specifications, all Contractors must provide evidence that they are properly licensed for the classification of work for this project. Evidence shall be in the form of a copy of current license clearly indicating all classifications, or sub-classifications, bid limits, license number; and expiration date.

General Contractor Bidders may obtain digital copies of drawings and specifications from the Architect for each project upon receipt of Application for Bid. General Contractors will then be placed on Official Bidders List. Hard copy sets of drawings/ specifications will be available to General Contractors for purchase directly from the document printer: Alabama Graphics. Addenda and other proposal information will be issued only to holders of drawings and specifications distributed by the Architect and on the Official Bidders List. Release of contract documents to the bidder does not imply acceptance of the bidder's qualifications by the Owner or Architect.

Bids received from General Contractors who are not on the Official Bidders List may not be accepted or opened. Lathan McKee Architects makes no guarantee for plans and specifications obtained by Contractors and Vendors from sources other than the printed contract documents provided by their firm. Contractors and Vendors who base their pricing from contract documents obtained from other electronic sources, either in part or whole, do so at their own risk.

Bids must be submitted on proposal forms furnished by the Architect or copies thereof, issued either with the original contract documents or by addendum. General Contractors shall not use Proposal Forms other than those provided in the contract documents.

All bidders bidding in amounts exceeding that established by the State Licensing Board for General Contractors must be licensed under the provisions of Title 34, Chapter 8, Code of Alabama, 1975. The Bidder must display current General Contractor's License Number on the outside of the sealed envelope in which the proposal is delivered, or it will not be considered by the Architect or Owner. The Owner reserves the right to reject any or all proposals and to waive technical errors if, in the Owner's judgment, the best interests of the Owner will thereby be promoted.

Shelby County Board of Education
Awarding Authority
Lathan Associates Architects, P.C. dba Lathan McKee Architects
205-988-9112

PRE-BID PROCEDURES

OBTAINING PLANS AND SPECIFICATIONS

A. General Contractors

General Contractors must contact the office of the Architect to receive an Application for Bid and give the following information about their company:

1. Name, address, phone, email address, Alabama General Contractor's License Number, Bid Limit, and Bid Classification as it appears on current license. This is required in order for Architect to verify that Contractor is currently licensed in a classification that qualifies the General Contractor to bid on the subject project.

2. Upon receipt of the completed Application for Bid Form, General Contractor Bidders may obtain digital copies of drawings and specifications from the Architect. General Contractors will then be placed on Official Bidders List. Hard copy sets of drawings/ specifications will be available to General Contractors for purchase directly from the document printer: Alabama Graphics. Addenda and other proposal information will be issued only to holders of drawings and specifications distributed by the Architect and on the Official Bidders List. Release of contract documents to the bidder does not imply acceptance of the bidder's qualifications by the Owner or Architect.

3. Bids received from General Contractors who are not on the Official Bidders List may not be accepted or opened. Lathan Associates Architects, P.C. makes no guarantee for plans and specifications obtained by Contractors and Vendors from sources other than the Architect or the designated contract printer.

4. The following Plan Room is used:

    a. Alabama Graphics Digital Plan Room is also used. See attachment for contact information. **Project Password is Lathan**.

5. Addenda are only sent to the Plan Rooms, the Awarding Authority and the General Contractors who are on the Official Bidders List. Addenda are not sent to Subcontractors and/or Vendors.

6. CAD files will not be sent by the Architect, Engineers or Consultants to Contractors for bid purposes.

B. Subcontractors and Vendors

1. Subcontractors and Vendors may view and/or obtain plans and/or specifications from the following sources:
    a. Alabama Graphics Digital Plan Room.
    b. General Contractors

2. Architect's office will not release plans and specifications to Subcontractors or Vendors.

3. Official Bidders List is available on Alabama Graphics Digital Plan Room.

    a. So that we may maintain an updated Official Bidders List, as a courtesy, we ask that Contractor submit an email to the office of the Architect if they would like to withdraw.

REQUEST FOR INFORMATION (RFI's)

A. All RFI's must be numbered and made in writing to the Architect's email rfi@lathanassociates.com. Please include your name, company name and telephone number, so that we may respond appropriately. **VERBAL RFI'S WILL NOT BE ANSWERED. ALL RFI'S MUST BE IN WRITING.**

B. The Team List provided within the Specification Manual is for informational purposes only and should

not be used to contact Engineers and/or Consultants directly with questions regarding the project.

C. All questions that need to be directed to an Engineer / Consultant must be routed through the Architect's office. If applicable, the Architect will contact the appropriate Engineer / Consultant for information.

D. Bids shall be based upon the official Contract Documents consisting of Plans, Specifications and Addenda. Architect assumes no responsibility for information used by Contractors outside the official Contract Documents.

E. We will not respond to any correspondence received via any e-mail other than the one listed.

F. It is recommended that all RFI's be submitted prior to two business days before Bid.

REQUESTS FOR PRODUCT APPROVAL

A. All Requests for Product Approval must be made in writing to the office of the Architect at least ten (10) days prior to the date set for the opening of bids. Requests must be accompanied by Product Substitution Form completed and signed found in Specification Section - 01360 and should be emailed to Lathan Associates Architects, rfi@lathanassociates.com. Please include your name, company name, telephone number, email address so that we may respond appropriately.

B. Vendor/Contractor submitting Request for Product Approval must submit data sheets and other such project specific fact-based documentation for substitution with items clearly marked to show compliance with product originally specified. Request must identify model number of substitution that complies with product originally specified. **Architect and Interior Design staff will not review Requests for Product Approval that are catalogs and/or binders of manufactured products without separate details showing comparison between specified product and requested substitution.**

C. Products approved by Architect, Interior Designer, Engineer and/or Consultant shall be contingent upon meeting or exceeding the specification and drawing requirements. All approved requests for product approval shall be acknowledged in writing via Addendum.

D. The Team List provided within the Specification Manual is for informational purposes only and should not be used to contact Engineers and/or Consultants directly with requests for product approval. **No product approval shall be considered unless submitted through the Architect via rfi@lathanassociates.com email address.**

PRE-BID REQUEST FOR INFORMATION FORM

Date: _____

Company Submitting Request: _____

Contact Name: _____ **Phone:** _____

E-Mail _____

Project Name: _____

Architect Job No. _____

Send to rfi@lathanassociates.com

RFI NO. _____

RESPONSE:

For Architect's Use:
Reviewed By / Date: _____
Responded By/ Date: _____
Processed by Addendum No. _____
Comments: _____

Digital Plan Room Sign-On Instructions

To access the Digital Plan Room, please click on the following link. You will want to add this as a trusted site for future emails.
https://www.algraphicsplanroom.com

You will need to register to the plan room as a user. Click **"Log In"** on lower left side. You will need to do a search to see if your company already exists on the plans room. Once you register your company and contact information click on **"Private Jobs with Passwords"** and enter the password provided.

Password for this project is lathan.

For technical assistance please call, Customer Service 205.252.8505 or customerservice@algraphics.com.

INSTRUCTIONS TO BIDDERS

CONTENTS

1. BID DOCUMENTS:

The Bid Documents consist of the Advertisement for Bids, these Instructions to Bidders, any supplements to these Instructions to Bidders, the Proposal Form and the Accounting of Sales Tax, and the proposed Contract Documents. The proposed Contract Documents consist of the Construction Contract, the Performance Bond and Payment Bond, the Conditions of the Contract (General, Supplemental, and other Conditions), Drawings, Specifications and all addenda issued prior to execution of the Construction Contract. Bid Documents may be obtained or examined as set forth in the Advertisement for Bids.

2. GENERAL CONTRACTOR'S STATE LICENSING REQUIREMENTS:

When the amount bid for a contract is $100,000 or more, the bidder must be licensed by the State Licensing Board for General Contractors and must show the Architect evidence of license before bidding or the bid will not be received by the Architect or considered by the Awarding Authority. A bid exceeding the bid limit stipulated in the bidder's license, or which is for work outside of the type or types of work stipulated in the bidder's license, will not be considered. In case of a joint venture of two or more contractors, the amount of the bid shall be within the maximum bid limitation as set by the State Licensing Board for General Contractors of the combined limitations of the partners to the joint venture.

3. QUALIFICATIONS of BIDDERS and PREQUALIFICATION PROCEDURES:

a. Any special qualifications required of general contractors, subcontractors, material suppliers, or fabricators are set forth in the Bid Documents.

b. The Awarding Authority may have elected to prequalify bidders. Parties interested in bidding for this contract are directed to the Advertisement for Bids and Supplemental Instructions to Bidders to determine whether bidders must be prequalified and how they may obtain copies of the Awarding Authority's published prequalification procedures and criteria.

c. Release of Bid Documents by the Architect to a prospective bidder will not constitute any determination by the Awarding Authority or Architect that the bidder has been found to be qualified, prequalified, or responsible.

4. PREFERENCE to RESIDENT CONTRACTORS:
(If this project is federally funded in whole or in part, this Article shall not apply.)

a. In awarding the Contract, preference will be given to Alabama resident contractors and a nonresident bidder domiciled in a state having laws granting preference to local contractors shall be awarded the Contract only on the same basis as the nonresident bidder's state awards contracts to Alabama contractors bidding under similar circumstances.

b. A nonresident bidder is a contractor which is neither organized and existing under the laws of the State of Alabama, nor maintains its principal place of business in the State of Alabama. A nonresident contractor which has maintained a permanent office within the State of Alabama for at least five continuous years shall not thereafter be deemed to be a non-resident contractor so long as the contractor continues to maintain a branch office within Alabama.

5. EXAMINATION of BID DOCUMENTS and the SITE of the WORK:

Before submitting a bid for the Work, the bidders shall carefully examine the Bid Documents, visit the site, and satisfy themselves as to the nature and location of the Work, and the general and local conditions, including weather, the general character of the site or building, the character and extent of existing work within or adjacent to the site and any other work being performed thereon at the time of submission of their bids. They shall obtain full knowledge as to transportation, disposal, handling, and storage of materials, availability of water, electric power, and all other facilities in the area which will have a bearing on the performance of the Work for which they submit their bids. The submission of a bid shall constitute a representation by the bidder that the bidder has made such examination and visit and has judged for and satisfied himself or herself as to conditions to be encountered regarding the character, difficulties, quality, and quantities of work to be performed and the material and equipment to be furnished, and as to the contract requirements involved.

6. EXPLANATIONS and INTERPRETATIONS:

a. Should any bidder observe any ambiguity, discrepancy, omission, or error in the drawings and specifications, or in any other bid document, or be in doubt as to the intention and meaning of these documents, the bidder should immediately report such to the Architect and request clarification.

b. Clarification will be made only by written Addenda sent to all prospective bidders. Neither the Architect nor the Awarding Authority will be responsible in any manner for verbal answers or instructions regarding intent or meaning of the Bid Documents.

c. In the case of inconsistency between drawings and specifications or within either document, a bidder will be deemed to have included in its bid the better quality or greater quantity of the work involved unless the bidder asked for and obtained the Architect's written clarification of the requirements before submission of a bid.

7. SUBSTITUTIONS:

a. The identification of any product, material, system, item of equipment, or service in the Bid Documents by reference to a trade name, manufacturer's name, model number, etc. (hereinafter referred to as "source"), is intended to establish a required standard of performance, design, and quality and is not intended to limit competition unless the provisions of paragraph "d" below apply.

b. When the Bid Documents identify only one or two sources, or three or more sources followed by "or approved equal" or similar wording, the bidder's proposal may be based on a source not identified but considered by the bidder to be equal to the standard of performance, design and quality as specified; however, such substitutions must ultimately be approved by the Architect. If the bidder elects to bid on a substitution without "Pre-bid Approval" as described below, then it will be understood that proof of compliance with specified requirements is the exclusive responsibility of the bidder.

c. When the Bid Documents identify three or more sources and the list of sources is not followed by "or approved equal" or similar wording, the bidder's proposal shall be based upon one of the identified sources, unless the bidder obtains "Pre-bid Approval" of another source as described below. Under these conditions it will be expressly understood that no product, material, system, item of equipment, or service that is not identified in the Bid Documents or granted "Pre-Bid Approval" will be incorporated into the Work unless such substitution is authorized and agreed upon through a Contract Change Order.

d. If the Bid Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the bidder's proposal must be based upon the identified sole source.

e. Procedures for "Pre-bid Approval". If it is desired that a product, material, system, piece of equipment, or service from a source different from those sources identified in the Bid Documents be approved as an acceptable source, application for the approval of such source must reach the hands of the Architect at least ten days prior to the date set for the opening of bids. At the Architect's discretion, this ten day provision may be waived. The application for approval of a proposed source must be accompanied by technical data which the applicant desires to submit in support of the application. The Architect will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed source with previous users, evidence of reputation of the source for prompt delivery, evidence of reputation of the source for efficiency in servicing its products, or any other pertinent written information. The application to the Architect for approval of a proposed source must be accompanied by a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Bid Documents. The burden of proof of the merit of the proposed substitution is upon the proposer. To be approved, a proposed source must also meet or exceed all express requirements of the Bid Documents. Approval, if granted, shall not be effective until published by the Architect in an addendum to the Bid Documents.

8. PREPARATION and DELIVERY of BIDS:

a. DCM Form C-3: Proposal Form:

(1) Bids must be submitted on the Proposal Form as contained in the Bid Documents; only one copy is required to be submitted. A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with the Proposal Form.

(2) All information requested of the bidder on the Proposal Form must be filled in. The form must be completed by typewriter or hand-printed in ink.

(3) Identification of Bidder: On the first page of the Proposal Form the bidder must be fully identified by completing the spaces provided for:

- **(a)** the legal name of the bidder,
- **(b)** the state under which laws the bidder's business is organized and existing,
- **(c)** the city (and state) in which the bidder has its principal offices,
- **(d)** the bidder's business organization, i.e., corporation, partnership, or individual (to be indicated by marking the applicable box and writing in the type of organization if it is not one of those listed), and
- **(e)** the partners or officers of the bidder's organization, if the bidder is other than an individual. If the space provided on the Proposal Form is not adequate for this listing, the bidder may insert "See Attachment" in this space and provide the listing on an attachment to the Proposal Form.

(4) Where indicated by the format of the Proposal Form, the bidder must specify lump sum prices in both words and figures. In case of discrepancy between the prices shown in words and in figures, the words will govern.

(5) All bid items requested in the Proposal Form, including alternate bid prices and unit prices for separate items of the Work, must be bid. If a gross sum of bid items is requested in the Proposal Form, the gross sum shall be provided by the bidder.

(6) In the space provided in the Proposal Form under "Bidder's Alabama License", the bidder must insert his or her current general contractor's state license number, current bid limit, and type(s) of work for which bidder is licensed.

(7) The Proposal Form shall be properly signed by the bidder. If the bidder is:

- **(a)** **an individual**, that individual or his or her "authorized representative" must sign the Proposal Form;
- **(b)** **a partnership,** the Proposal Form must be signed by one of the partners or an "authorized representative" of the Partnership;
- **(c)** **a corporation,** the president, vice-president, secretary, or "authorized representative" of the corporation shall sign and affix the corporate seal to the Proposal Form.

As used in these Instructions to Bidders, "authorized representative" is defined as a person to whom the bidder has granted written authority to conduct business in the bidder's behalf by signing and/or modifying the bid. Such written authority shall be signed by the bidder (the individual proprietor, or a member of the Partnership, or an officer of the Corporation) and shall be attached to the Proposal Form.

(8) Interlineation, alterations or erasures on the Proposal Form must be initialed by the bidder or its "authorized representative".

b. DCM Form C-3A: Accounting of Sales Tax

A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

c. Bid Guaranty

(1) The Proposal Form must be accompanied by a cashier's check, drawn on an Alabama bank, or a Bid Bond, executed by a surety company duly authorized and qualified to make such bonds in the State of Alabama, payable to the Awarding Authority.

(2) If a Bid Bond is provided in lieu of a cashier's check, the bond shall be on the Bid Bond form as stipulated in the Bid Documents.

(3) The amount of the cashier's check or Bid Bond should not be less than five percent of the contractor's bid, but is not required to be in an amount more than ten thousand dollars.

d. Delivery of Bids:

(1) Bids will be received until the time set, and at the location designated, in the Advertisement for Bids unless notice is given of postponement. Any bid not received prior to the time set for opening bids will be rejected absent extenuating circumstances and such bids shall be rejected in all cases where received after other bids are opened.

(2) Each bid shall be placed, together with the bid guaranty, in a sealed envelope. On the outside of the envelope the bidder shall write in large letters "Proposal", below which the bidder shall identify the Project and the Work bid on, the name of the bidder, and the bidder's current general contractor's state license number.

(3) Bids may be delivered in person, or by mail if ample time is allowed for delivery. When sent by mail, the sealed envelope containing the bid, marked as indicated above, shall be enclosed in another envelope for mailing.

9. WITHDRAWAL or REVISION of BIDS:

a. A bid may be withdrawn prior to the time set for opening of bids, provided a written request, executed by the bidder or the bidder's "authorized representative", is filed with the Architect prior to that time. The bid will then be returned to the bidder unopened.

b. A bid which has been sealed in its delivery envelope may be revised by writing the change in price and date on the outside of the delivery envelope over the signature of the bidder or the bidder's "authorized representative". In revising the bid in this manner, the bidder must only write the amount of the change in price on the envelope **and must not reveal the bid price.**

c. Written communications, signed by the bidder or its "authorized representative", to revise bids will be accepted if received by the Architect prior to the time set for opening bids. The Architect will record the instructed revision upon opening the bid. Such written communication may be by facsimile if so stipulated in Supplemental Instructions to Bidders. In revising the bid in this manner, the bidder must only write the amount of the change in price **and must not reveal the bid price.**

d. Except as provided in Article 12 of these Instructions to Bidders, no bid shall be withdrawn, modified, or corrected after the time set for opening bids.

10. OPENING of BIDS:

a. Bids will be opened and read publicly at the time and place indicated in the Advertisement for Bids. Bidders or their authorized representatives are invited to be present.

b. A list of all proposed major subcontractors and suppliers will be submitted by Bidders to the Architect at a time subsequent to the receipt of bids as established by the Architect in the Bid Documents but in no event shall this time exceed twenty-four (24) hours after receipt of bids. If the list includes a fire alarm contractor and/or fire sprinkler contractor, Bidders will also submit a copy of the fire alarm contractor's and/or fire sprinkler contractor's permits from the State of Alabama Fire Marshal's Office.

11. INCOMPLETE and IRREGULAR BIDS:

A bid that is not accompanied by data required by the Bid Documents, or a bid which is in any way incomplete, may be rejected. Any bid which contains any uninitialed alterations or erasures, or any bid which contains any additions, alternate bids, or conditions not called for, or any other irregularities of any kind, will be subject to rejection.

12. BID ERRORS:

a. Errors and Discrepancies in the Proposal Form. In case of error in the extension of prices in bids, the unit price will govern. In case of discrepancy between the prices shown in the figures and in words, the words will govern.

b. Mistakes within the Bid. If the low bidder discovers a mistake in its bid, the low bidder may seek withdrawal of its bid without forfeiture of its bid guaranty under the following conditions:

(1) Timely Notice: The low bidder must notify the Awarding Authority and Architect in writing, within three working days after the opening of bids, that a mistake was made. This notice must be given within this time frame whether or not award has been made.

(2) Substantial Mistake: The mistake must be of such significance as to render the bid price substantially out of proportion to the other bid prices.

(3) Type of Mistake: The mistake must be due to calculation or clerical error, an inadvertent omission, or a typographical error which results in an erroneous sum. A mistake of law, judgment, or opinion shall not constitute a valid ground for withdrawal without forfeiture.

(4) Documentary Evidence: Clear and convincing documentary evidence of the mistake must be presented to the Awarding Authority and the Architect as soon as possible, but no later than three working days after the opening of bids.

The Awarding Authority's decision regarding a low bidder's request to withdraw its bid without penalty shall be made within 10 days after receipt of the bidder's evidence or by the next regular meeting of the Awarding Authority. Upon withdrawal of bid without penalty, the low bidder shall be prohibited from (1) doing work on the project as a subcontractor or in any other capacity and (2) bidding on the same project if it is re-bid.

13. DISQUALIFICATION of BIDDERS:

Any bidder(s) may be disqualified from consideration for contract award for the following reasons:

a. Collusion. Any agreement or collusion among bidders or prospective bidders in restraint of freedom of competition to bid at a fixed price or to refrain from bidding or otherwise shall render the bids void and shall cause the bidders or prospective bidders participating in such agreement or collusion to be disqualified from submitting further bids to the Awarding Authority on future lettings. (See § 39-2-6, Code of Alabama 1975, for possible criminal sanctions.)

b. Advance Disclosure. Any disclosure in advance of the terms of a bid submitted in response to an Advertisement for Bids shall render the proceedings void and require re-advertisement and rebid.

c. Failure to Settle Other Contracts. The Awarding Authority may reject a bid from a bidder who has not paid, or satisfactorily settled, all bills due for labor and material on other contracts in force at the time of letting.

14. CONSIDERATION of BIDS:

a. After the bids are opened and read publicly, the bid prices will be compared and the results of this comparison will be available to the public. Until the final award of the contract, however, the Awarding Authority shall have the right to reject any or all bids, and it shall have the right to waive technical errors and irregularities if, in its judgment, the bidder will not have obtained a competitive advantage and the best interests of the Awarding Authority will be promoted.

b. If the Bid Documents request bids for projects or parts of projects in combination or separately, the Bid Documents must include supplements to, these Instructions to Bidders setting forth applicable bid procedures. Award or awards will be made to the lowest responsible and responsive bidder or bidders in accordance with such bid procedures.

15. DETERMINATION of LOW BIDDER by USE of ALTERNATES:

a. The Awarding Authority may request alternate bid prices (alternates) to facilitate either reducing the base bid to an amount within the funds available for the project or adding items to the base bid within the funds available for the project. Alternates, if any, are listed in the

Proposal Form in the order in which they shall cumulatively deduct from or add to the base bid for determining the lowest bidder.

b. If alternates are included in the Proposal Form, the Awarding Authority shall determine the dollar amount of funds available and immediately prior to the opening of bids shall announce publicly the funds available for the project. The dollar amount of such funds shall be used to determine the lowest bidder as provided herein below, notwithstanding that the actual funds available for the project may subsequently be determined to be more or less than the expected funds available as determined immediately prior to the time of the opening of bids.

c. If the base bid of the lowest bidder exceeds the funds available and alternate bid prices will reduce the base bids to an amount that is within the funds available, the lowest bidder will be determined by considering, in order, the fewest number of the alternates that produces a price within the funds available. If the base bid of the lowest bidder is within the funds available and alternate bid prices will permit adding items to the base bid, the lowest bidder will be determined by considering, in order, the greatest number of the alternates that produces a price within the funds available.

d. After the lowest bidder has been determined as set forth above, the Awarding Authority may award that bidder any combination of alternates, provided said bidder is also the low bidder when only the Base Bid and such combination of alternates are considered.

16. UNIT PRICES:

a. Work Bid on a Unit Price Basis. Where all, or part(s), of the planned Work is bid on a unit price basis, both the unit prices and the extensions of the unit prices constitute a basis of determining the lowest responsible and responsive bidder. In cases of error in the extension of prices of bids, the unit price will govern. A bid may be rejected if any of the unit prices are obviously unbalanced or non-competitive.

b. Unit Prices for Application to Change Orders. As a means of predetermining unit costs for changes in certain elements of the Work, the Bid Documents may require that the bidders furnish unit prices for those items in the Proposal Form. Unit prices for application to changes in the work are not a basis for determining the lowest bidder. Non-competitive unit prices proposed by the successful bidder may be rejected and competitive prices negotiated by the Awarding Authority prior to contract award. Unit prices for application to changes in the work are not effective unless specifically included and agreed upon in the Construction Contract.

17. AWARD of CONTRACT:

a. The contract shall be awarded to the lowest responsible and responsive bidder unless the Awarding Authority finds that all the bids are unreasonable or that it is not in the best interest of the Awarding Authority to accept any of the bids. A responsible bidder is one who, among other qualities determined necessary for performance, is competent, experienced, and financially able to perform the contract. A responsive bidder is one who submits a bid that complies with the terms and conditions of the Advertisement for Bids and the Bid Documents. Minor irregularities in the bid shall not defeat responsiveness.

b. A bidder to whom award is made will be notified by telegram, confirmed facsimile, or letter to the address shown on the Proposal Form at the earliest possible date. Unless other

time frames are stipulated in Supplemental Instructions to Bidders, the maximum time frames allowed for each step of the process between the opening of bids and the issuance of an order to proceed with the work shall be as follows:

(1)	Award of contract by Awarding Authority	30 calendar days after the opening of bids
(2)	Contractor's return of the fully executed contract, with bonds and evidence of insurance, to the Awarding Authority	15 calendar days after the contract has been presented to the contractor for signature (from the Lead Design Professional)
(3)	Awarding Authority's approval of the contractor's bonds and evidence of insurance and completion of contract execution	20 calendar days after the contractor presents complete and acceptable documents to the Architect
(4)	Notice To Proceed issued to the contractor along with distribution of the fully executed construction contract to all parties.	15 calendar days after final execution of contract by the Awarding Authority, by various State Agencies if required and by the Governor if his or her signature on the contract is required by law

The time frames stated above, or as otherwise specified in the Bid Documents, may be extended by written agreement between the parties. Failure by the Awarding Authority to comply with the time frames stated above or stipulated in Supplemental Instructions to Bidders, or agreed extensions thereof, shall be just cause for the withdrawal of the contractor's bid and contract without forfeiture of bid security.

c. Should the successful bidder or bidders to whom the contract is awarded fail to execute the Construction Contract and furnish acceptable Performance and Payment Bonds and satisfactory evidence of insurance within the specified period, the Awarding Authority shall retain from the bid guaranty, if it is a cashier's check, or recover from the principal or the sureties, if the guaranty is a bid bond, the difference between the amount of the contract as awarded and the amount of the bid of the next lowest responsible and responsive bidder, but not more than $10,000. If no other bids are received, the full amount of the bid guaranty shall be so retained or recovered as liquidated damages for such default. Any sums so retained or recovered shall be the property of the Awarding Authority.

d. All bid guaranties, except those of the three lowest bona fide bidders, will be returned immediately after bids have been checked, tabulated, and the relation of the bids established. The bid guaranties of the three lowest bidders will be returned as soon as the contract bonds and the contract of the successful bidder have been properly executed and approved. When the award is deferred for a period of time longer than 15 days after the opening of the bids, all bid guaranties, except those of the potentially successful bidders, shall be returned. If no award is made within the specified period, as it may by agreement be extended, all bids will be rejected, and all guaranties returned. If any potentially successful bidder agrees in writing to a stipulated extension in time for consideration of its bid and its bid was guaranteed with a cashier's check, the Awarding Authority may permit the potentially successful bidder to substitute a satisfactory bid bond for the cashier's check.

END of INSTRUCTIONS TO BIDDERS

STATE OF ALABAMA
DEPARTMENT OF FINANCE
REAL PROPERTY MANAGEMENT
Division of Construction Management

Kay Ivey
Governor

Bill Poole
Director of Finance

P.O. Box 301150, Montgomery, AL 36130-1150
770 Washington Avenue, Suite 444, Montgomery, AL 36104
Telephone: (334) 242-4082 Fax: (334) 242-4182

Mickey Allen
Assistant Finance Director
Real Property Management

Frank Barnes, Director
Construction Management

E-Verify Memorandum of Understanding

Instructions for inclusion in project manuals.

Per DCM's May 29, 2012 bulletin *Guidance on Act 2012-491 Amending the Alabama Immigration Law*: "Contractors (including architects and engineers) will … be required to enroll in the E-Verify program and to provide documentation of enrollment in the E-Verify program with their contracts or agreements."

Upon completing enrollment in the E-Verify program available at https://www.e-verify.gov/employers/enrolling-in-e-verify, an E-Verify Memorandum of Understanding (MOU) is issued to the enrolled business. The same E-Verify MOU can be repeatedly used until any information in the business's E-Verify user profile is updated, at which time E-Verify updates the printable Company Information section of the MOU, while the original signatory information remains the same. Typically, an E-Verify MOU is 13-18 pages long depending on business type and number of employees.

DCM requires a copy of the entire current E-Verify MOU document including the completed Department of Homeland Security – Verification Division section (with name, signature and date included) to be submitted as an attachment to each Construction Contract original and to each Agreement Between Owner and Architect original.

PROPOSAL FORM

To: Shelby County Board of Education Date: _____

In compliance with your Advertisement for Bids and subject to all the conditions thereof, the undersigned,

_____
(Legal name of Bidder)

hereby proposes to furnish all labor and materials and perform all work required for the construction of

WORK: New Gymnasium Addition To Montevallo High School, Architect's Job No. 25-33.

In accordance with Drawings and Specifications, dated, October 23, 2025 and prepared by Lathan Associates Architects, P.C., dba Lathan McKee Architects, 300 Chase Park South, Suite 200, Hoover, AL 35244, Architect.

The Bidder, which is organized and existing under the laws of the State of _____ ,

having its principal offices in the City of _____ ,

is: _____ a Corporation _____ a Partnership _____ an individual _____ (other)_____,

LISTING OF PARTNERS OR OFFICERS: If Bidder is a Partnership, list all partners and their addresses; if Bidder is a Corporation, list the names, titles and business addresses of its Officers:

_____

_____

_____

BIDDER'S REPRESENTATION: The Bidder declares that it has examined the site of the Work, having become fully informed regarding all pertinent conditions, and that it has examined the Drawings and Specifications (including all Addenda received) for the Work and the other Bid and Contract Documents relative thereto; and that it has satisfied itself relative to the Work to be performed.

ADDENDA: The Bidder acknowledges receipt of Addenda Nos. _____ through _____ inclusively.

ALLOWANCES: The Bidder acknowledges by initials _____ that he/she has read Specification Section 01020 - Allowances and has included cost of same in bid.

ALABAMA IMMIGRATION LAW COMPLIANCE: The Bidder acknowledges by initials_____that he/she will comply with H.B. 56 - Alabama Immigration Law Compliance.

BASE BID: For construction complete as shown and specified, the sum of _____ Dollars ($ _____)

ALTERNATES: If alternates as set forth in the Bid Documents are accepted, the following adjustments are to be made to the Base Bid:

Alternate No. 1: Food Service Equipment (add) $ _____

UNIT PRICES: As indicated on the Proposal Attachment.

BID SECURITY: The undersigned agrees to enter into a Construction Contract and furnish the prescribed Performance and Payment Bonds and evidence of insurance within fifteen calendar days, or such other period stated in the Bid Documents, after the contract forms have been presented for signature, provided such presentation is made within 30 calendar days after the opening of bids, or such other period stated in the Bid Documents. As security for this condition, the undersigned further agrees that the funds represented by the Bid Bond (or cashier's check) attached hereto may be called and paid into the account of the Awarding Authority as liquidated damages for failure to comply.

Attached hereto is a: (*Mark the appropriate space and provide the applicable information.)*

____Bid Bond, executed by _____ as Surety,

____cashier's check on the _____ Bank of _____ ,

for the sum of _____ Dollars

($ _____) made payable to the Awarding Authority.

BIDDER'S ALABAMA LICENSE:
State License for General Contracting: _____
License Number Bid Limit Type(s) of Work

CERTIFICATIONS: The undersigned certifies that he or she is authorized to execute contracts on behalf of the Bidder as legally named, that this proposal is submitted in good faith without fraud or collusion with any other bidder, that the information indicated in this document is true and complete, and that the bid is made in full accord with State law. Notice of acceptance may be sent to the undersigned at the address set forth below.

The Bidder also declares that a list of all proposed major subcontractors and suppliers will be submitted at a time subsequent to the receipt of bids as established by the Architect in the Bid Documents but in no event shall this time exceed twenty-four (24) hours after receipt of bids.

Legal Name of Bidder _____

Mailing Address _____

*** By (Legal Signature)** _____ *(Seal)*

* Name & Title (print) _____

Telephone Number _____

Email Address _____

* If other than an individual proprietor, or an above named member of the Partnership, or the above named president, vice-president, or secretary of the Corporation, attach written authority to bind the Bidder. Any modification to a bid shall be over the initials of the person signing the bid, or of an authorized representative.

Note: A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

PROPOSAL FORM ATTACHMENT

UNIT PRICES

For certain items of **credit or extra work**, if required, the undersigned proposes UNIT PRICES as follows:

EARTH EXCAVATION	General	$_____/per cu. yd.
	In Trenches	$_____/per cu. yd.
EARTH FILL	General	$_____/per cu. yd.
UNDERCUTTING & REPLACEMENT OF UNSUITABLE SOILS		$_____/per cu. yd.
LEAN CONCRETE		$_____/per cu. yd.
BIAXIAL GEOGRID (TENSAR BX1200 OR EQUIVALENT)		$_____/per sq. yd.
ALDOT NO. 57 STONE		$_____/per ton
ALDOT 825B		$_____/per ton

Note: All grading shown on the drawings shall be included in the Base Bid as Unclassified to required subgrade elevations. This Base Bid grading shall include the required cutting and filling of the existing grade to the proposed subgrade elevation. Onsite Geotechnical engineer shall determine if unsuitable soils are present.

Refer to SECTION 02300 - EARTHWORK for additional information regarding undercut & replacement of unsuitable soils and associated quantity allowance.

Note: Costs for profit and overhead shall be included in Unit Prices.

Note: Unit Prices are provided for the addition to or deletion from the contract Base Bid.

BIDDER (to be signed by an Officer of the Company)

_____ by_____
(Name/Title) (Legal Signature)

WITNESS (to the above signature)

_____ by_____
(Name/Title) (Legal Signature)

DCM Form C-3A
(must be submitted with DCM Form C-3)
August 2021

ACCOUNTING OF SALES TAX
Attachment to DCM Form C-3: Proposal Form

To: Shelby County Board Of Education Date: _____
(Awarding Authority)

NAME OF PROJECT: New Gymnasium Addition to Montevallo Highh School

SALES TAX ACCOUNTING

Pursuant to Act 2013-205, Section 1(g) the Contractor accounts for the sales tax NOT included in the bid proposal form as follows:

			ESTIMATED SALES TAX AMOUNT
BASE BID:			$ _____
	Description		
Alternate No. 1	Food Service Equipment	(add)	$ _____

Failure to provide an accounting of sales tax shall render the bid non-responsive. Other than determining responsiveness, sales tax accounting shall not affect the bid pricing nor be considered in the determination of the lowest responsible and responsive bidder.

Legal Name of Bidder _____

Mailing Address _____

* By (Legal Signature) _____

* Name (type or print) _____

* Title _____ *(Seal)*

Telephone Number _____

Email Address _____

Note: A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A with DCM Form C-3 is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

BID BOND

The **PRINCIPAL** (*Bidder's company name and address*)
Name:
Address:

The **SURETY** (*Company name and primary place of business*)
Name:
Address:

The **OWNER** (*Entity name and address*)
Name:
Address:

The **PROJECT** for which the Principal's Bid is submitted: (*Project name as it appears in the Bid Documents*)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Principal and Surety, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the **PENAL SUM of five percent (5%) of the amount of the Principal's bid, but in no event more than Ten-thousand Dollars ($10,000.00)**.

THE CONDITION OF THIS OBLIGATION is that the Principal has submitted to the Owner the attached bid, which is incorporated herein by reference, for the Project identified above.

NOW, THEREFORE, if, within the terms of the Bid Documents, the Owner accepts the Principal's bid and the Principal thereafter either:

(a) executes and delivers a Construction Contract with the required Performance and Payment Bonds (each in the form contained in the Bid Documents and properly completed in accordance with the bid) and delivers evidence of insurance as prescribed in the Bid Documents, or

(b) fails to execute and deliver such Construction Contract with such Bonds and evidence of insurance, but pays the Owner the difference, not to exceed the Penal Sum of this Bond, between the amount of the Principal's Bid and the larger amount for which the Owner may award a Construction Contract for the same Work to another bidder,

then, this obligation shall be null and void, otherwise it shall remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that the obligation of the Surety under this Bond shall not in any manner be impaired or affected by any extension of the time within which the Owner may accept the Principal's bid, and the Surety does hereby waive notice of any such extension.

SIGNED AND SEALED this _____ day of _____, _____.

ATTEST:

_____

PRINCIPAL:

_____

By _____

_____
Name and Title

SURETY:

ATTEST:

_____

_____

By_____

_____
Name and Title

Do not staple this form and/or attachments; use clips. Print single-sided; do not submit double-side printed documents.

Numbers in margin correspond to "Checklist", DCM Form B-7

(1) **DCM (BC) Project # _____** *(required)*

PSCA Project # _____ *(required)*

CONSTRUCTION CONTRACT

(2) This Construction Contract is entered into this day of in the year of between the **OWNERS, the ALABAMA PUBLIC SCHOOL AND COLLEGE AUTHORITY**

(3) and **LOCAL OWNER,**
Entity Name:
Address:
Email & Phone #:

(4) and the **CONTRACTOR,**
Company Name:
Address:
Email & Phone #:

State of AL Accounting & Resource System (STAARS) or AL Buys Vendor No.: _____

(5) for the **WORK** of the Project, identified as:

(6) The **CONTRACT DOCUMENTS** are dated and have been amended by

(7) **ADDENDA**

(8) The **ARCHITECT** is
Firm Name:
Address:
Email & Phone #:

(9) The **CONTRACT SUM** is

Dollars ($) and is the sum of the Contractor's Base Bid for the Work and the following

(10) **BID ALTERNATE PRICES:**

(11) The **CONTRACT TIME** is ( ) calendar days.

THE OWNER AND THE CONTRACTOR AGREE AS FOLLOWS: The Contract Documents, as defined in the General Conditions of the Contract (DCM Form C-8), are incorporated herein by reference. The Contractor shall perform the Work in accordance with the Contract Documents. The Owner will pay and the Contractor will accept as full compensation for such performance of the Work, the Contract Sum subject to additions and deductions (including liquidated damages) as provided in the Contract Documents. The Work shall commence on a date to be specified in a Notice to Proceed issued by the Owner or the Director, Alabama Division of Construction Management, and shall then be substantially completed within the Contract Time.

(12) **LIQUIDATED DAMAGES** for which the Contractor and its Surety (if any) shall be liable and may be required to pay the Owner in accordance with the Contract Documents shall be equal to six percent interest per annum on the total Contract Sum unless a dollar amount is stipulated in the following space, in which case liquidated damages shall be determined at _____ dollars ($_____) per calendar day.

Numbers in margin correspond to "Checklist", DCM Form B-7

(13) **SPECIAL PROVISIONS** *(such as acceptance or rejection of unit prices. Indicate continuation on an attachment if needed;*

A. SEVERABLE PAYMENTS: The Alabama Public School and College Authority will first pay the Contractor _____ Dollars ($_____) from its available funds and the_____ will thereafter pay the Contractor the remaining _____ Dollars ($_____) from its available funds.

B.

(14) **STATE GENERAL CONTRACTOR'S LICENSE**: The Contractor does hereby certify that Contractor is currently licensed by the Alabama State Licensing Board for General Contractors and that the certificate for such license bears the following:

License No.:

Classification(s):

Bid Limit:

The Owner and Contractor have entered into this Construction Contract as of the date first written above and have executed this Construction Contract in sufficient counterparts to enable each contracting party to have an originally executed Construction Contract each of which shall, without proof or accounting for the other counterparts, be deemed an original thereof.

The Owner does hereby certify that this Construction Contract was let in accordance with the provisions of Title 39, Code of Alabama 1975, as amended, and all other applicable provisions of law, and that the terms and commitments of this Construction Contract do not constitute a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26.

Numbers in margin correspond to "Checklist", DCM Form B-7

(15)

APPROVALS

**ALABAMA DEPARTMENT OF FINANCE,
REAL PROPERTY MANAGEMENT,
DIVISION OF CONSTRUCTION MANAGEMENT
(DCM)**

By _____
Director

REVIEWED BY AND FUNDS AVAILABLE:
PSCA funds are available in the amount stated in
(13) "Special Provisions", Paragraph A.

By _____
Contract Administrator

CONTRACTING PARTIES

_____
Contractor Company

By _____
Signature

Name & Title _____

_____
Local Owner Entity

By _____
Signature

Name & Title _____

ALABAMA PUBLIC SCHOOL and COLLEGE AUTHORITY

By _____ Date: _____
Governor and President of Authority

Review/Signature flow: Architect/Engineer (prepare documents) > Contractor (review and sign) > Architect/Engineer (review) > Local Owner (review and sign) > DCM (review and sign) > Finance-Legal > Governor (review and sign) > DCM (distribute the fully executed Contract to all parties along with a Notice to Proceed).

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

(1) # PERFORMANCE BOND

SURETY'S BOND NUMBER

Do not staple this form; use clips.

(2) The **PRINCIPAL** (*Company name and address of Contractor as appears in the Construction Contract*)
Name:
Address:

(3) The **SURETY** (*Company name and primary place of business*)
Name:
Address:

(4) The **OWNER: The ALABAMA PUBLIC SCHOOL AND COLLEGE AUTHORITY** and
(*Local Owner entity's name and address, same as appears in the Construction Contract*)
Name:
Address:

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above for the performance of the Contract, and Contract Change Orders, in accord with the requirements of the Contract Documents, which are incorporated herein by reference. If the Contractor performs the Contract, and Contract Change Orders, in accordance with the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

3. Whenever the Architect gives the Contractor and the Surety, at their addresses stated above, a written Notice to Cure a condition for which the Contract may be terminated in accordance with the Contract Documents, the Surety may, within the time stated in the notice, cure or provide the Architect with written verification that satisfactory positive action is in process to cure the condition.

4. The Surety's obligation under this Bond becomes effective after the Contractor fails to satisfy a Notice to Cure and the Owner:

(a) gives the Contractor and the Surety, at their addresses stated above, a written Notice of Termination declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the notice; and

(b) gives the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation under this Bond.

5. In the presence of the conditions described in Paragraph 4, the Surety shall, at its expense:

(a) On the effective date of the Notice of Termination, take charge of the Work and be responsible for the safety, security, and protection of the Work, including materials and equipment stored on and off the Project site, and

(b) Within twenty-one days after the effective date of the Notice of Termination, proceed, or provide the Owner with written verification that satisfactory positive action is in process to facilitate proceeding promptly, to complete the Work in accordance with the Contract Documents, either with the Surety's resources or through a contract between the Surety and a qualified contractor to whom the Owner has no reasonable objection.

6. As conditions precedent to taking charge of and completing the Work pursuant to Paragraph 5, the Surety shall neither require, nor be entitled to, any agreements or conditions other than those of this Bond and the Contract Documents. In taking charge of and completing the Work, the Surety shall assume all rights and obligations of the Contractor under the Contract Documents; however, the Surety shall also have the right to assert "Surety Claims" to the Owner in accordance with the Contract Documents. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to promptly take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

7. By accepting this Bond as a condition of executing the Construction Contract, and by taking the actions described in Paragraph 4, the Owner agrees that:

(a) the Owner shall promptly advise the Surety of the unpaid balance of the Contract Sum and, upon request, shall make available or furnish to the Surety, at the cost of reproduction, any portions of the Project Record, and

(b) as the Surety completes the Work, or has it completed by a qualified contractor, the Owner shall pay the Surety, in accordance with terms of payment of the Contract Documents, the unpaid balance of the Contract Sum, less any amounts that may be or become due the Owner from the Contractor under the Construction Contract or from the Contractor or the Surety under this Bond.

8. In the presence of the conditions described in Paragraph 4, the Surety's obligation includes responsibility for the correction of Defective Work, liquidated damages, and reimbursement of any reasonable expenses incurred by the Owner as a result of the Contractor's default under the Contract, including architectural, engineering, administrative, and legal services.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

9. Nothing contained in this Bond shall be construed to mean that the Surety shall be liable to the Owner for an amount exceeding the Penal Sum of this Bond, except in the event that the Surety should be in default under the Bond by failing or refusing to take charge of and complete the Work pursuant to Paragraph 5. If the Surety should fail or refuse to take charge of and complete the Work, the Owner shall have the authority to take charge of and complete the Work, or have it completed, and the following costs to the Owner, less the unpaid balance of the Contract Sum, shall be recoverable under this Bond:

(a) the cost of completing the Contractor's responsibilities under the Contract, including correction of Defective Work;

(b) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to completing the Work;

(c) interest on, and the cost of obtaining, funds to supplement the unpaid balance of the Contract Sum as may be necessary to cover the foregoing costs;

(d) the fair market value of any reductions in the scope of the Work necessitated by insufficiency of the unpaid balance of the Contract Sum and available supplemental funds to cover the foregoing costs; and

(f) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to ascertaining and collecting the Owner's losses under the Bond.

10. All claims and disputes arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract.

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9 & 10)

SURETY:	**CONTRACTOR as PRINCIPAL:**
_____	_____
Surety Company Name	Contractor Company Name
By_____	By_____
_____	_____
Signee's Printed Name and Title	Signee's Printed Name and Title

(11) NOTE: Original power of attorney for the Surety's signatory shall be furnished with each of the original three bond forms to be attached to each of the three contract copies (with original signatures) per project.

Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

(1) # PAYMENT BOND

SURETY'S BOND NUMBER

Do not staple this form; use clips.

(2) The **PRINCIPAL** *(Company name and address of Contractor as appears in the Construction Contract)*
Name:
Address:

(3) The **SURETY** (Company *name and primary place of business*)
Name:
Address:

(4) The **OWNER: The ALABAMA PUBLIC SCHOOL AND COLLEGE AUTHORITY** and (*Local Owner entity's name and address, same as appears in the Construction Contract*)
Name:
Address:

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above to promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract, which is incorporated herein by reference, and any modifications thereof by Contract Change Orders. If the Contractor and its Subcontractors promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders, then this obligation shall be null and void; otherwise to remain and be in full force and effect.

2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

3. Any person that has furnished labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders for which payment has not been timely made may institute a civil action upon this Bond and have their rights and claims adjudicated in a civil action and judgment entered thereon. Notwithstanding the foregoing, a civil action may not be instituted on this bond until 45 days after written notice to the Surety of the amount claimed to be due and the nature of the claim. The civil action must commence not later than one year from the date of final settlement of the Contract. The giving of notice by registered or certified mail, postage prepaid, addressed to the Surety at any of its places of business or offices shall be deemed sufficient. In the event the Surety or Contractor fails to pay the claim in full within 45 days from the mailing of the notice, then the person or persons may recover from the Contractor and Surety, in addition to the amount of the claim, a reasonable attorney's fee based on the result, together with interest on the claim from the date of the notice.

4. Every person having a right of action on this bond shall, upon written application to the Owner indicating that labor, material, or supplies for the Work have been supplied and that payment has not been made, be promptly furnished a certified copy of this bond and the Construction Contract. The claimant may bring a civil action in the claimant's name on this Bond against the Contractor and the Surety, or either of them, in the county in which the Work is to be or has been performed or in any other county where venue is otherwise allowed by law.

5. This bond is furnished to comply with Code of Alabama, §39-1-1, and all provisions thereof shall be applicable to civil actions upon this bond.

6. All claims and disputes between Owner and either the Contractor or Surety arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract.

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9 & 10)

SURETY:	**CONTRACTOR as PRINCIPAL:**
_____	_____
Surety Company Name	Contractor Company Name
By_____	By_____
_____	_____
Signee's Printed Name and Title	Signee's Printed Name and Title

(11) NOTE: Original power of attorney for the Surety's signatory shall be furnished with each of the original three bond forms to be attached to each of the three contract copies (with original signatures) per project.

Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

State of Alabama
Disclosure Statement

Required by Article 3B of Title 41, Code of Alabama 1975

ENTITY COMPLETING FORM

ADDRESS

CITY, STATE, ZIP TELEPHONE NUMBER

STATE AGENCY/DEPARTMENT THAT WILL RECEIVE GOODS, SERVICES, OR IS RESPONSIBLE FOR GRANT AWARD

ADDRESS

CITY, STATE, ZIP TELEPHONE NUMBER

This form is provided with:

☐ Contract ☐ Proposal ☐ Request for Proposal ☐ Invitation to Bid ☐ Grant Proposal

Have you or any of your partners, divisions, or any related business units previously performed work or provided goods to any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify below the State Agency/Department that received the goods or services, the type(s) of goods or services previously provided, and the amount received for the provision of such goods or services.

STATE AGENCY/DEPARTMENT	TYPE OF GOODS/SERVICES	AMOUNT RECEIVED

Have you or any of your partners, divisions, or any related business units previously applied and received any grants from any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify the State Agency/Department that awarded the grant, the date such grant was awarded, and the amount of the grant.

STATE AGENCY/DEPARTMENT	DATE GRANT AWARDED	AMOUNT OF GRANT

1. List below the name(s) and address(es) of all public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF PUBLIC OFFICIAL/EMPLOYEE	ADDRESS	STATE DEPARTMENT/AGENCY

2. List below the name(s) and address(es) of all family members of public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the public officials/public employees and State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF FAMILY MEMBER	ADDRESS	NAME OF PUBLIC OFFICIAL/ PUBLIC EMPLOYEE	STATE DEPARTMENT/ AGENCY WHERE EMPLOYED

If you identified individuals in items one and/or two above, describe in detail below the direct financial benefit to be gained by the public officials, public employees, and/or their family members as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

Describe in detail below any indirect financial benefits to be gained by any public official, public employee, and/or family members of the public official or public employee as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

List below the name(s) and address(es) of all paid consultants and/or lobbyists utilized to obtain the contract, proposal, request for proposal, invitation to bid, or grant proposal:

NAME OF PAID CONSULTANT/LOBBYIST	ADDRESS

By signing below, I certify under oath and penalty of perjury that all statements on or attached to this form are true and correct to the best of my knowledge. I further understand that a civil penalty of ten percent (10%) of the amount of the transaction, not to exceed $10,000.00, is applied for knowingly providing incorrect or misleading information.

Signature Date

Notary's Signature Date Date Notary Expires

Article 3B of Title 41, Code of Alabama 1975 requires the disclosure statement to be completed and filed with all proposals, bids, contracts, or grant proposals to the State of Alabama in excess of $5,000.

Revised: 09/2013

DCM Form C-10
Revised July 2022

DCM (BC) No. _____

PSCA Projects: PSCA No. _____

Application No. _____

Date: _____

APPLICATION and CERTIFICATE for PAYMENT

Attach DCM Form C-10SOV: Schedule of Values

TO OWNER: Entity Name: Address:	PROJECT:
FROM CONTRACTOR: Company Name & Address, which must exactly match co. name & payment address spelling as registered in State of AL Accounting & Resource System (STAARS) or AL Buys to avoid rejection: STAARS or AL Buys Vendor #:	ARCHITECT / ENGINEER: Firm Name: Address:

A. Total Original Contract	$
B. Fully Executed (fully signed) Change Order(s) Numbers __ through __	+$ _____
C. Total Contract To Date	$

1. Work Completed to Date per attached Schedule of Values *(Form C-10SOV's Column F Total)*		$
2. Materials Presently Stored *(When this amount is greater than $0.00, attach Form C-10SM: Inventory of Stored Materials, or similar list)*		+$ _____
3. Total Work Completed to Date & Materials Presently Stored *(_____% of Contract To Date)*		$
4. Less Retainage *(If Total Work Completed to Date & Materials Presently Stored (#3) is less than or equal to 50% of Total Contract to Date (C), Retainage = #3 x 0.05. Once #3 exceeds 50% of C and up until project is complete, Retainage = C x 0.025. $0 is retained on final payment application, see last bullet point below Instructions.)*	Final pay app? ☐ Yes.	−$ _____
5. Total Due		$
6. Less Total Previous Payments Billed *(Must exactly match #5 Total Due from previous payment application. # 6 is $0.00 if there is no previous payment application)*		−$ _____
7. Balance Due This Estimate		$

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that to the best of his knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by him for Work for which previous Certificates for Payments were issued and payments received from the Owner and that current payment shown herein has not yet been received.

By: _____ Date: _____
Contractor's Signature

Name & Title _____

Sworn and subscribed before me this _____ day of _____
Day Month, Year

Seal:

_____
Notary Public's Signature

ARCHITECT'S / ENGINEER'S CERTIFICATION

In accordance with the Contract Documents, the Architect/ Engineer certifies to the Owner that, to the best of the Architect's/ Engineer's knowledge and belief, the Work has progressed to the point indicated herein, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the amount approved.

By _____
Architect's / Engineer's Signature

Name & Title _____

Date _____

INSTRUCTIONS

- PSCA-funded projects, and State Agency-owned projects: Two copies of pay. app., each with original signatures and all attachments required.
- Date of first payment application cannot precede the Notice to Proceed's Begin Date.
- Pay. app. must exactly match an attached DCM Form C-10SOV: Schedule of Values.
- A change order must be fully executed before inclusion on a payment application.
- Contractor's signature date cannot precede the payment application date.
- Contractor and Notary signee dates must match.
- Progress schedules must be included with non-final payment applications.
- One payment application per month may be submitted.
- On a final payment application, the following is required for release of retainage: all change orders must be fully executed (signed by all parties and approval authorities) and included in B., the Certificate of Substantial Completion for entire work is fully executed, and all other close-out requirements per General Conditions Article 34 are completed.

APPROVAL

_____
Owner Entity

By _____
Signature

Name & Title _____

Date _____

SCHEDULE OF VALUES (SOV)

DCM Form C-10SOV
Revised October 2021

Project:	DCM (BC) Project Number:
	PSCA Project Number, if any:
Contractor Company:	Application Number:
	Application Date:
	Period From: / Period To:

A	B	C	D	E	F	G	H	I	J
Item No.	Description of Work	Scheduled Value (including fully executed [signed by all parties] change order amounts)	Work Completed: Work Previously Completed (Previous pay app SOV's column F. D is $0 if this SOV is for first pay app.)	Work Completed: Work Completed This Period (Period as noted above)	Total Work Completed to Date (This application SOV's D + E)	Materials Presently Stored (G total greater than $0 must match C-10SM's column E total. This SOV's G amounts are not in this SOV's D nor E amounts.)	Total Work Completed to Date & Materials Presently Stored (This SOV's F + G)	Percent of Contract Completed to Date (This SOV's H / C)	Retainage (This column's Total's cell formula calculates the applicable variable rate)
1.					$ -		$ -		Retainage Variable Rate:
2.					$ -		$ -		
3.					$ -		$ -		
4.					$ -		$ -		If Total Work Completed to Date & Materials Presently Stored (H) is less than or equal to 50% of Total Scheduled Value (C), Retainage = H x 0.05.
5.					$ -		$ -		
6.					$ -		$ -		
7.					$ -		$ -		
8.					$ -		$ -		
9.					$ -		$ -		
10.					$ -		$ -		
11.					$ -		$ -		
12.					$ -		$ -		
13.					$ -		$ -		
14.					$ -		$ -		
15.					$ -		$ -		Once H exceeds 50% of C and up until project is complete, Retainage = C x 0.025.
16.					$ -		$ -		
17.					$ -		$ -		
18.					$ -		$ -		
19.					$ -		$ -		
20.					$ -		$ -		
21.					$ -		$ -		There will be no retainage on final payment application.
22.					$ -		$ -		
23.					$ -		$ -		
24.					$ -		$ -		
25.					$ -		$ -		
	TOTALS:	$ -	$ -	$ -	$ -	$ -	$ -		$ -
This pay app SOV's column totals must match amounts in this pay app Form C-10 per the following indicated Form C-10 line #s:		C.	None	None	1.	2.	3.	3.	4.

Note: If this SOV's column G: Materials Presently Stored includes any amounts other than $0, then DCM Form C-10SM: Inventory of Stored Materials with back-up receipts must be submitted as part of the payment application documentation.

INVENTORY OF STORED MATERIALS

DCM Form C-10SM
Revised October 2021

Project:	DCM (BC) No.:
	PSCA No, if any:
Contractor Company:	For Estimate No.:
	For Period Ending:

A	B	C	D	E
Description	**Materials Stored Last Period**	**Materials Purchased This Period (period noted above)**	**Materials Used This Period (period noted above)**	**Materials Presently Stored (B + C - D)**
TOTALS:				

Instructions :

· This Form C-10SM must be submitted as part of the payment application documentation when a Materials Presently Stored amount of anything greater than $0 is noted on line 2 of DCM Form C-10: Application and Certificate for Payment.

· Receipts must be provided as attachments to this form C-10SM for all amounts placed in Column C: Materials Purchased This Period.

· The total $ amount of this Form C-10SM's column E: Materials Presently Stored must match both Form C-10's line 2: Materials Presently Stored, and Form C-10SOV: Schedule of Values' total $ amount of Column G: Materials Presently Stored.

· The $ amounts in this current Form C-10SM's Column D: Materials Used This Period are amounts that must all be included in the current payment application's Form C-10SOV's Column E: Work Completed This Period.

· The $ amounts in this current Form C-10SM's Column E: Materials Presently Stored are the amounts that must be listed in the next payment application's Form C-10SM's Column B: Materials Stored Last Period.

SAMPLE PROGRESS SCHEDULE & REPORT	CONTRACTOR (Contractor may use own form in lieu of Form C-11):	DATE OF REPORT:
DCM (BC) No.:		
PSCA projects: PSCA No.:		PROCEED DATE:
PROJECT:	ARCHITECT/ENGINEER:	PROJECTED COMPLETION DATE:

	WORK DIVISION	%	AMOUNT													
1.	GENERAL REQUIREMENTS															
2.	SITEWORK															
3.	CONCRETE															
4.	MASONRY															
5.	METALS															
6.	WOOD AND PLASTIC															100%
7.	THERMAL AND MOISTURE PROTECTION															90%
8.	DOORS AND WINDOWS															80%
9.	FINISHES															70%
10.	SPECIALTIES															60%
11.	EQUIPMENT															50%
12.	FURNISHINGS															40%
13.	SPECIAL CONSTRUCTION															30%
14.	CONVEYING SYSTEMS															20%
15.	MECHANICAL															10%
16.	ELECTRICAL															0%
TOTAL ORIG. CONTRACT		100%														
ANTICIPATED DRAW IN $1,000																
ACTUAL DRAW IN $1,000																

LEGEND: ANTICIPATED ACTIVITY — ACTUAL ACTIVITY — ANTICIPATED CASH FLOW — ACTUAL CASH FLOW

USE ADDITIONAL SHEETS IF JOB IS SCHEDULED OVER 12 MONTHS.

DCM Form C-11 August 2021

Do not staple this form and/or attachments; use clips. Print single-sided; do not submit double-side printed documents.

DCM Form 9-J, August 2021;
PSCA version of DCM Form C-12;
A Change Order is not valid without an accompanying completed Change Order Justification (DCM Form B-11).

CONTRACT CHANGE ORDER

Change Order No. _____ **Date** _____

DCM (BC) # _____ *(required)*

PSCA # _____ *(required)*

TO: Contractor Company Name & Address:	**PROJECT:**

TERMS: You are hereby authorized, subject to the provisions of your Contract for this project, to make the following changes thereto in accordance with your proposal(s) dated _____

_____.

FURNISH the necessary labor, materials, and equipment to (*Description of work to be done or changes to be made. If the description is continued in an attachment, identify the attachment below.*):

Description continued from Page 1:

ORIGINAL CONTRACT SUM $ _____

NET TOTAL OF PREVIOUS CHANGE ORDERS $ _____

PREVIOUS REVISED CONTRACT SUM $ _____

THIS CHANGE ORDER WILL ☐ **INCREASE** ☐ **DECREASE THE CONTRACT SUM BY** $ _____

REVISED CONTRACT SUM, INCLUDING THIS CHANGE ORDER $ _____

EXTENSION OF TIME resulting from this Change Order: ☐ None *or* _____ Calendar days

The amount of this Change Order will be the responsibility of _____
(*Owner and/or PSCA*)

The Owner does hereby certify that this Change Order was executed per the provisions of Title 39, Code of Alabama, 1975, as amended.

_____
Architectural/Engineering Firm

Recommended By _____

Name & Title _____

APPROVALS

**ALABAMA DEPARTMENT OF FINANACE,
REAL PROPERTY MANAGEMENT
DIVISION OF CONSTRUCTION MANAGEMENT (DCM)**

By _____
Director

Reviewed By _____
Contract Administrator

For DCM office use only:

_____ PSCA funds are available to fund this change order.

_____ PSCA funds will not be used to fund this change order.

CONTRACTING PARTIES

_____
Contractor Company

By _____

Name & Title _____

_____
Local Owner Entity

By _____

Name & Title _____

ALABAMA PUBLIC SCHOOL & COLLEGE AUTHORITY

By _____ Date: _____
Governor and President of Authority

CONSENT OF SURETY (for additive $ change orders only)

_____
Surety Company

By _____
(Attach current Power of Attorney)

Name & Title _____

Review/Signature flow: Architect/Engineer (prepare documents) > Contractor (review and sign) (> Surety for additive $ change orders only [sign]) > Architect/Engineer (review and sign) > Local Owner (review and sign) > DCM (review and sign) > Finance-Legal > Governor (review and sign) > DCM (distribute fully executed Change Order to all parties).

TO: **Alabama Department of Finance**
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, Alabama 36104
(334) 242-4082 FAX (334) 242-4182

CHANGE ORDER JUSTIFICATION

Purpose and instructions on next page.
Do not staple this form and/or attachments; use clips.

Change Order No. _____

Date: _____

DCM (BC) No. _____

(A)

PROJECT NAME & LOCATION:	OWNER ENTITY NAME & ADDRESS:
CONTRACTOR COMPANY NAME & ADDRESS:	ARCHITECTURAL / ENGINEERING FIRM NAME & ADDRESS:

(B) **DESCRIPTION OF PROPOSED CHANGE(S):** **ATTACH CONTRACTOR'S DETAILED COST PROPOSAL(s)**

AMOUNT: ☐ **ADD** ☐ **DEDUCT $_____** **TIME EXTENSION: _____ CALENDAR DAYS**

(C)

ORIGINAL CONTRACT AMOUNT		PREVIOUS C.O.'s _____ THRU _____		CONTRACT AMOUNT PRIOR TO PROPOSED CHANGE ORDER
$_____	+	$_____	=	$_____

(D) **JUSTIFICATION FOR NEED OF CHANGE(S):**

(E) **JUSTIFICATION OF CHANGE ORDER vs. COMPETITIVE BID:**

(F) **ARCHITECT / ENGINEER'S EVALUATION OF PROPOSED COST:**

(G)

CHANGE ORDER RECOMMENDED	CHANGE ORDER JUSTIFIED AND APPROVED
_____ ARCHITECTURAL / ENGINEERING FIRM NAME	_____ LOCAL OWNER ENTITY NAME
By: _____ ARCHITECT / ENGINEER'S SIGNATURE	By: _____ OWNER'S SIGNATURE
By: _____ OWNER'S PROJECT REPRESENTATIVE'S SIGNATURE	By: _____ OWNER'S LEGAL COUNSEL'S SIGNATURE

CHANGE ORDER JUSTIFICATION: PURPOSE and INSTRUCTIONS

PURPOSE

The awarding of work through an existing contract may potentially conflict with, or violate, the "Competitive Bid Laws" of the State of Alabama. **The determination of legality of Change Orders rests with the Awarding Authority and its legal advisor.** In a June 15, 1979, Opinion, the Office of the Attorney General offered guidelines for making such determinations in conjunction with considering the facts and merits of each situation. The purpose of the CHANGE ORDER JUSTIFICATION is to provide a means through which the Awarding Authority considers these guidelines and the intent of the "Competitive Bid Laws" when authorizing Change Orders. Pursuant to these guidelines, the following types of changes meet the criteria for awarding work through Change Orders in lieu of through the Competitive Bid process:

I. Minor Changes for a monetary value less than required for competitive bidding.

II. Changes for matters relatively minor and incidental to the original contract necessitated by unforeseeable circumstances arising during the course of the work.

III. Emergencies arising during the course of the work of the contract.

IV. Bid alternates provided for in the original bidding where there is no difference in price of the change order from the original best bid on the alternate.

V. Changes of relatively minor items not contemplated when the plans and specifications were prepared and the project was bid which are in the public interest and which do not exceed 10% of the contract price.

Under these guidelines the cumulative total of Change Orders, including any negotiations to bring the original contract price within the funds available, would become questionable if the total of such changes and negotiations exceed 10% of the original contract price. These guidelines are not intended to interfere with the Awarding Authority's good faith discretion to respond to specific situations in the public's best interest. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign the Change Order Justification prior to submission to the Division of Construction Management (DCM).

INSTRUCTIONS

The CHANGE ORDER JUSTIFICATION is to be prepared by the design professional, who has evaluated the fairness and reasonableness of the proposed cost of the change(s) and recommends that the proposed Change Order be executed. The fully executed Form B-11: CHANGE ORDER JUSTIFICATION must accompany the proposed DCM Form C-12: Change Order. Instructions for completing the B-11 form are:

1. Insert the proposed Change Order Number, date of the Justification, and DCM (BC) Project Number in the spaces provided in the upper right-hand corner.

2. **Section (A):** Insert the complete name and address of the PROJECT, OWNER, CONTRACTOR, AND ARCHITECT/ENGINEER.

3. **Section (B)**: Provide a complete description of the proposed changes in work, referring to and attaching revised specifications and/or drawings as appropriate. An attachment may be used if additional space is needed, but insert the proposed amount and time extension of the change(s) in the spaces provided. **Attached a copy of the contractor's detailed cost proposal.**

4. **Section (C**): Insert the Original Contract amount, the net increase or decrease of previous Change Orders, and the Current Contract amount (preceding the currently proposed Change Order).

5. **Section (D):** Explain why it is necessary, or in the public's interest, to make the proposed change(s) to the Work.

6. **Section (E)**: Explain why award of the changed work to the existing contractor instead of awarding the work under the competitive bid process is justified.

7. **Section (F)**: The design professional must state his evaluation of the reasonableness and fairness of the proposed costs based upon his review of the contractor's proposal.

8. **Section (G)**: The design professional must recommend the Change Order to the Owner by signing the document; the Owner may require such recommendation from other individuals. The Owner must sign the document indicating that they believe change order action in lieu of the competitive bid process is justified for the proposed change(s). **Review of the matter and signing of the document by the Owner's legal counsel is highly recommended. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign the Change Order Justification prior to submission to DCM.**

GENERAL CONTRACTOR'S ROOFING GUARANTEE

DCM Project No. _____

Project Name & Address	Project Owner Entity(ies) Name(s) & Address(es)

General Contractor's Company Name, Address, & Telephone Number	**EFFECTIVE DATES OF GUARANTEE**
	Date of Acceptance:
	Date of Expiration:

1. The General Contractor does hereby certify that the roofing work included in this contract was installed in strict accordance with all requirements of the plans and specifications and in accordance with approved roofing manufacturers recommendations.

2. The General Contractor does hereby guarantee the roofing and associated work including but not limited to all flashing and counter flashing both composition and metal, roof decking and/or sheathing; all materials used as a roof substrate or insulation over which roof is applied; promenade decks or any other work on the surface of the roof; metal work; gravel stops and roof expansion joints to be absolutely watertight and free from all leaks, due to faulty or defective materials and workmanship for a period of five (5) years, starting on the date of substantial completion of the project. This guarantee does not include liability for damage to interior contents of building due to roof leaks, nor does it extend to any deficiency which was caused by the failure of work which the general contractor did not damage or did not accomplish or was not charged to accomplish.

3. Subject to the terms and conditions listed below, the General Contractor also guarantees that during the Guarantee Period he will, at his own cost and expense, make or cause to be made such repairs to, or replacements of said work, in accordance with the roofing manufacturers standards as are necessary to correct faulty and defective work and/or materials which may develop in the work including, but not limited to: blisters, delamination, exposed felts, ridges, wrinkles, splits, warped insulation and/or loose flashings, etc. in a manner pursuant to the total anticipated life of the roofing system and the best standards applicable to the particular roof type in value and in accordance with construction documents as are necessary to maintain said work in satisfactory condition, and further, to respond on or within three (3) calendar days upon proper notification or leaks or defects by the Owner or Architect.

A. Specifically excluded from this Guarantee are damages to the work, other parts of the building and building contents caused by: (1) lightning, windstorm, hailstorm and other unusual phenomena of the elements; and (2) fire. When the work has been damaged by any of the foregoing causes, the Guarantee shall be null and void until such damage has been repaired by the General Contractor, and until the cost and expense thereof has been paid by the Owner or by the responsible party so designated.

B. During the Guarantee Period, if the Owner allows alteration of the work by anyone other than the General Contractor, including cutting, patching and maintenance in connection with penetrations, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the owner engages the General Contractor to perform said alterations, the Guarantee shall not become null and void, unless the General Contractor, prior to proceeding with the said work, shall have notified the Owner in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the work, thereby reasonably justifying a termination of this Guarantee.

C. Future building additions will not void this guarantee, except for that portion of the future addition that might affect the work under this contract at the point of connection of the roof areas, and any damage caused by such addition. If this contract is for roofing of an addition to an existing building, then this guarantee covers the work involved at the point of connection with the existing roof.

D. During the Guarantee period, if the original use of the roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

E. The Owner shall promptly notify the General Contractor of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the General Contractor to inspect the work, and to examine the evidence of such leaks, defects or deterioration.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

_____
General Contractor's Authorized Signature

_____
Typed Name and Title

GENERAL CONTRACTOR'S FIVE YEAR BUILDING ENVELOPE GUARANTEE

Project Name and Address:	**Owner's Name and Address:**
Architect's Name and Address: LATHAN ASSOCIATES ARCHITECTS, P.C. 300 Chase Park South, Suite 200 Hoover, AL 35244 Architect's Job No.:_____	**General Contractor's Name, Address, and Phone No.:**
EFFECTIVE DATES OF GUARANTEE: Start: _____ (Date of Substantial Completion) Period: Five (5) Years	

General Contractor warrants to the Owner (named above) for a period of Five Years the entire Building Envelope will be weathertight, moisture and wind impermeable and uncompromised as a result of materials and/or workmanship provided. Should any portion of the Building Envelope develop moisture and/or wind infiltration during the warranty period, the General Contractor shall promptly address, employ clean-up and temporary measures to prevent further resultant damage and provide corrections to the Building Envelope and/or consequently damaged work of such quality consistent with the original scope of work as deemed by the Architect. Corrective work shall be subject to special scheduling as required to prevent disruption of the Owner's ongoing operations and shall be subject to the same General Conditions and work ethics as required for the original work.

Future building additions will not void this guarantee, except for that portion of the future addition that might affect the work under this contract at the point of connection and any damage caused by such addition. If this contract is for an addition to an existing building, then this guarantee covers the work involved at the point of connection.

Upon discovery, the Owner shall promptly notify the General Contractor of observed or suspected compromises and shall afford reasonable opportunity for the General Contractor to inspect the work, and to examine the evidence of such.

The General Contractor shall be afforded reasonable and scheduled opportunity to make periodic preventative observations of the work associated with this warranty.

This Building Envelope Warranty shall be effective concurrently with the required DCM Form C-9 General Contractor's Roofing Guarantee and both shall be submitted fully executed as independent documents to the Architect at the time of the Final Inspection.

This instrument has been duly executed this day of_____, 20 .

_____
General Contractor's Authorized Signature

_____
Typed Name and Title

GENERAL CONTRACTOR'S FIVE-YEAR BUILDING RENOVATION GUARANTEE

Project Name and Address:	**Owner's Name and Address:**
Architect's Name and Address: LATHAN ASSOCIATES ARCHITECTS, P.C. 300 Chase Park South, Suite 200 Hoover, AL 35244 Architect's Job No.:_____	**General Contractor's Name, Address, Phone N o .**
EFFECTIVE DATES OF GUARANTEE: Start: _____ (Date of Substantial Completion) Period: Five (5) Years	

General Contractor warrants to the Owner (named above) for a period of Five Years the new work provided integral to Building Envelope will be weathertight, moisture and wind impermeable and uncompromised as a result of materials and/or workmanship provided. Should any portion of the said work develop moisture and/or wind infiltration during the warranty period, the General Contractor shall promptly address, employ clean-up and temporary measures to prevent further resultant damage and provide corrections to the work and/or consequently damaged work of such quality consistent with the original scope of work as deemed by the Architect. Corrective work shall be subject to special scheduling as required to prevent disruption of the Owner's ongoing operations and shall be subject to the same General Conditions and work ethics as required for the original work.

Future building additions will not void this guarantee, except for that portion of the future addition that might affect the work under this contract at the point of connection and any damage caused by such addition. If this contract is for an addition to an existing building, then this guarantee covers the work involved at the point of connection.

Upon discovery, the Owner shall promptly notify the General Contractor of observed or suspected compromises and shall afford reasonable opportunity for the General Contractor to inspect the work, and to examine the evidence of such.

The General Contractor shall be afforded reasonable and scheduled opportunity to make periodic preventative observations of the work associated with this warranty.

This Building Envelope Warranty shall be effective concurrently with the required DCM Form C-9 General Contractor's Roofing Guarantee and both shall be submitted fully executed as independent documents to the Architect at the time of the Final Inspection.

This instrument has been duly executed this day of_____, 20 .

_____
General Contractor's Authorized Signature

_____
Typed Name and Title

TO: **Alabama Department of Finance**
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, AL 36130-1150
(334) 242-4082

Do not staple this form and/or attachments; use clips.
Print single-sided; do not submit double-side printed documents.

DCM Form C-13
Revised November 2022;
(Note: Use DCM Form C-13A for fully locally-funded K-12 & Public 4-Year University Capital Improvement, HVAC, & Roof Projects with both a total cost of $750,000 or Less and a contract awarded on or after 10/01/22)

CERTIFICATE OF SUBSTANTIAL COMPLETION

ROUTING PROCEDURES *ON NEXT PAGE*

DCM (BC) No. _____

OWNER ENTITY NAME AND ADDRESS:	**ARCHITECTURAL / ENGINEERING FIRM NAME AND ADDRESS:**
Email to receive executed copy: _____	Email to receive executed copy: _____
CONTRACTOR COMPANY NAME AND ADDRESS:	**BONDING COMPANY NAME AND ADDRESS:**
Email to receive executed copy: _____	Email to receive executed copy: _____
PROJECT:	

Substantial Completion has been achieved for ☐ the entire Work ☐ the following portion of the Work:

_____

_____.

The **Date of Substantial Completion** of the Work covered by this certificate is established to be _____.

"Substantial Completion" means the designated Work is sufficiently complete, in accordance with the Contract Documents, such that the Owner may occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work. The Date of Substantial Completion is the date upon which all warranties for the designated Work commence, unless otherwise agreed and recorded herein.

Punch List: A _____ page list of items to be completed or corrected prior to the Owner's approval of Final Payment is attached hereto, but does not alter the Contractor's responsibility to complete or correct all Work in full compliance with the Contract Documents. The Contractor shall complete or correct all items on the attached list, ready for re-inspection for Final Acceptance, within 30 days after the above Date of Substantial Completion, unless another date is stated here: _____.
If completed or corrected within this period, warranties of these items commence on the Date of Substantial Completion, otherwise such warranties commence on the date of Final Acceptance of each item.

Only <u>one</u> (1) originally executed substantial completion form shall be routed for signature. DCM office will mail the fully-executed original to the Owner and email copies to all parties.

RECOMMENDED BY *(signature and email address required)*:	
ARCHITECT/ENGINEER: _____	DATE: _____
CONTRACTING PARTIES:	
CONTRACTOR: _____	DATE: _____
OWNER: _____	DATE: _____
_____	DATE: _____
APPROVALS:	
DCM INSPECTOR: _____	DATE: _____
DCM CHIEF INSPECTOR: _____	DATE: _____
DCM DIRECTOR: _____	DATE: _____

CERTIFICATE OF SUBSTANTIAL COMPLETION ROUTING PROCEDURE

Only one (1) originally executed substantial completion form shall be routed for signature. DCM office will mail the fully-executed original to the owner and email copies to all parties.

ARCHITECT/ENGINEER: Sign and date document, then mail it to Contractor. Provide Owner with DCM Inspector's name & field office address; territories and addresses are available at www.dcm.alabama.gov/staff.aspx.

CONTRACTOR: Sign and date document, then mail it to Owner.

OWNER: Sign and date document, then mail it to DCM Inspector's field office address; DCM Inspector territories and addresses are available at www.dcm.alabama.gov/staff.aspx.

DCM INSPECTOR: Sign and date document, then mail it to DCM Montgomery office.

DCM OFFICE: After review and signature/date by DCM Chief Inspector and DCM Director, DCM office will mail the fully-executed original document to Owner and will email copies to all parties.

NOTICE

THE EXECUTED "GENERAL CONTRACTOR'S ROOFING GUARANTEE" (DCM Form C-9) AND ANY OTHER ROOFING WARRANTY REQUIRED BY THE CONTRACT MUST ACCOMPANY THIS CERTIFICATE TO OBTAIN DCM APPROVAL.

Also, any standard manufacturer's roofing guarantees which contain language regarding the governing of the guarantee by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such guarantees.

SAMPLE FORM OF ADVERTISEMENT FOR COMPLETION

LEGAL NOTICE

In accordance with Chapter 1, Title 39, Code of Alabama, 1975, as amended, notice is hereby given

that _____,
(*Contractor Company Name*)
Contractor, has completed the Contract for ☐(Construction) ☐(Renovation) ☐(Alteration) ☐(Equipment) ☐(Improvement) of (*Name of Project*):

at _____

(*Insert location data in County or City*)
for the State of Alabama and the (County) (City) of _____, Owner(s), and have made request for final settlement of said Contract. All persons having any claim for labor, materials, or otherwise in connection with this project should immediately notify

_____

_____
(*Architect / Engineer*)

_____
(Contractor)

_____
(Business Address)

NOTE: This notice must be run for a minimum of three weeks for projects of $100,000.00 or more. For acceptable methods of advertisement, see General Conditions of the Contract, Article 34. Proof of publication of the notice shall be made by the contractor to the authority by whom the contract was made by affidavit of the publisher or website owner and a printed copy of the notice published. A final settlement shall not be made upon the contract until the expiration of 30 days after the completion of the notice.

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Contractor's Affidavit of Payment of Debts and Claims

To Owner (*Entity name and address*)**:**	**Project** (*Same as appears in the Construction Contract*)**:**

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Construction Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

Supporting Documents Attached Hereto:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. DCM Form C-20, Consent of Surety to Final Payment, may be used for this purpose.

   Indicate attachment: ☐ Yes ☐ No

The following supporting document should be attached hereto if required by the Owner:

1. Contractor's Release of Waiver of Liens.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment supplies, to the extent required by the Owner, accompanied by the list thereof.
3. Contractor's Affidavit of Release of Liens, DCM Form C-19.

Contractor (*Insert company name and address*)**:**

By:_____
Signature of authorized representative

_____
Name and Title

Sworn to and subscribed before me this _____ day

of _____, _____.

_____
Notary Public's Signature

My commission expires: _____

Seal:

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Contractor's Affidavit of Release of Liens

To Owner (*Entity name and address*)**:**	**Project** (*Same as appears in the Construction Contract*)**:**

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Construction Contract referenced above.

EXCEPTIONS:

Supporting Documents Attached Hereto:

1. Contractor's Release of Waiver of Liens.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment supplies, to the extent required by the Owner, accompanied by the list thereof.

Contractor (*Insert company name and address*)**:**

By: _____
Signature of authorized representative

_____
Name and Title

Sworn to and subscribed before me this _____ day

of _____, _____.

_____
Notary Public's Signature

My commission expires: _____

Seal:

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Surety's Bond Number: _____

CONSENT OF SURETY TO FINAL PAYMENT

To Owner (*Entity name and address):*	**Project** (*Same as appears in the Construction Contract*)**:**

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the

Surety (*Insert name and address of Surety*)

on bond of

Contractor (*Insert name and address of Contractor*)

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to

Owner (*Insert name and address of Entity*)**:**

as set forth in said Surety's bond.

SIGNED AND SEALED this _____ day of _____, _____.

SURETY:

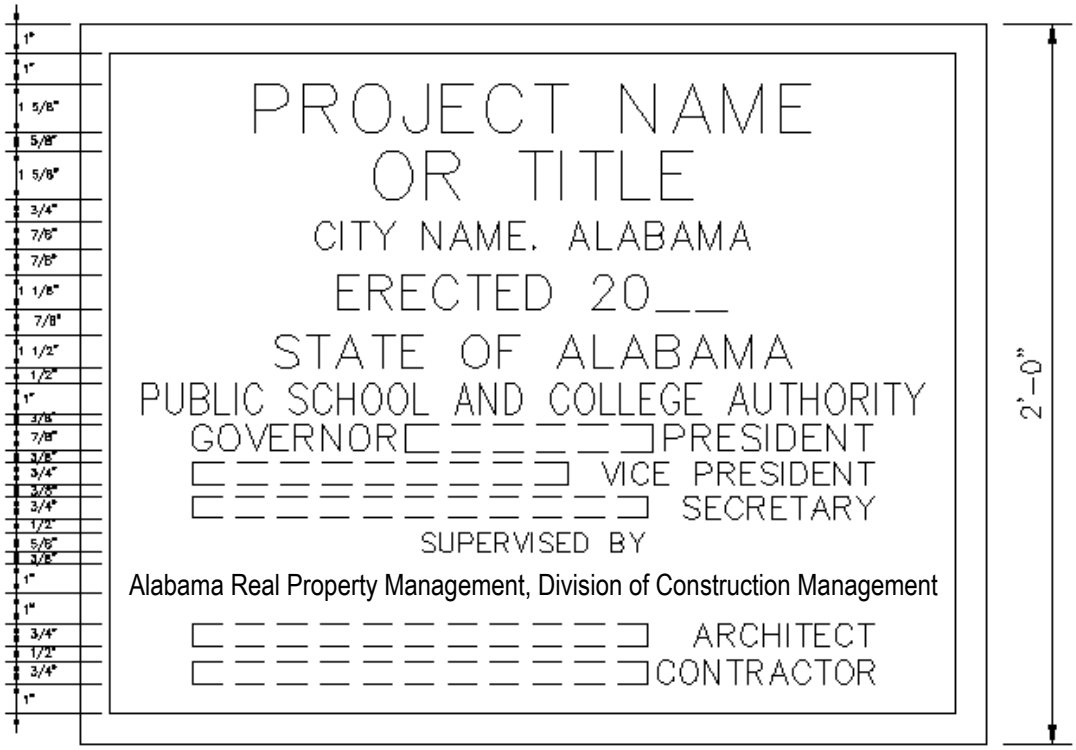
_____ Seal:
Company Name

By _____
Signature of Authorized Representative

_____
Printed Name and Title

Note: Original Power of Attorney for the Surety's signatory shall be furnished with each of the original forms to be attached to each of the four (4) final payment forms.

Detail of PSCA Plaque

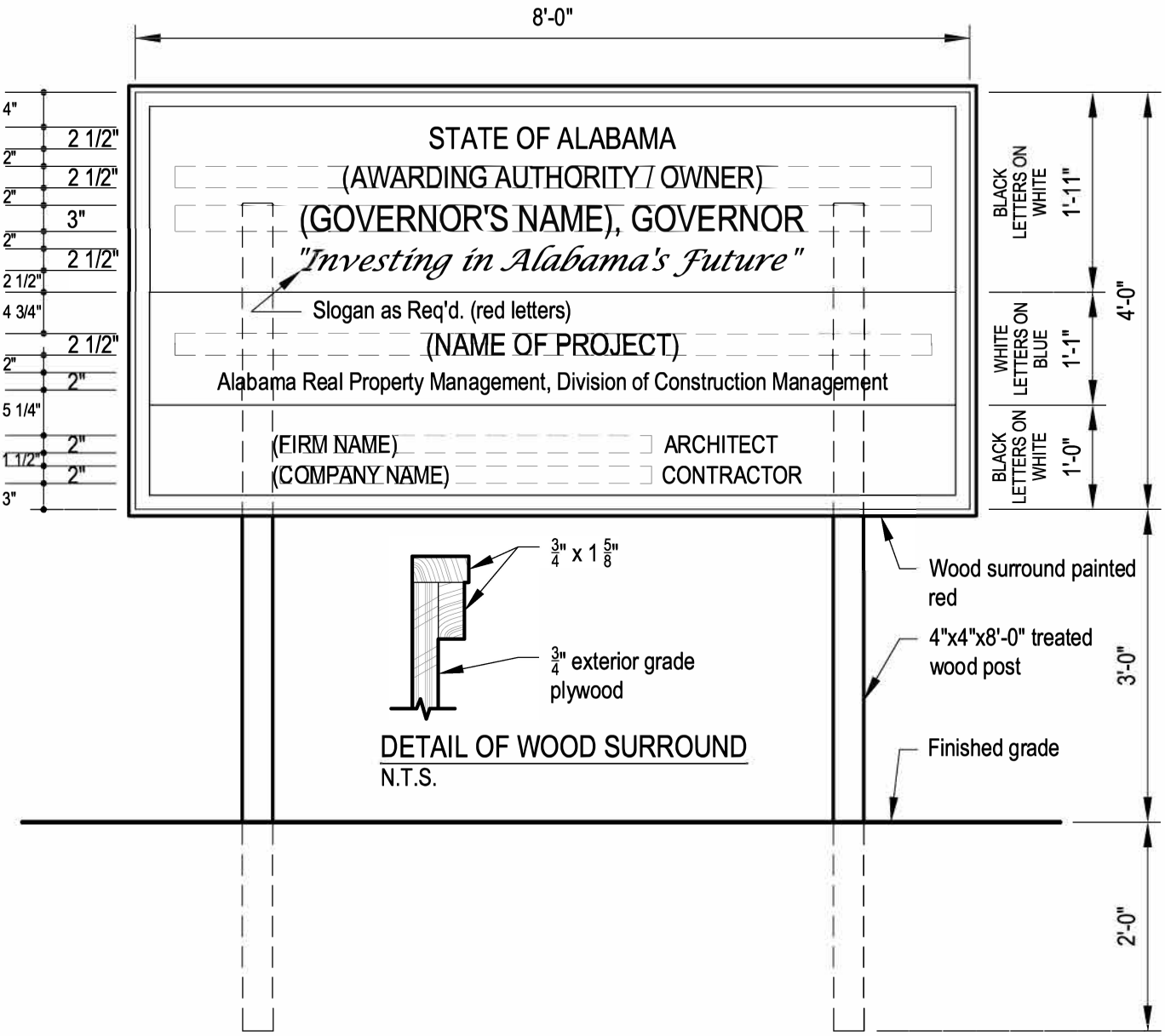


Notes:

1. PSCA plaques are installed as a permanent part of a building and are required on the following partially or fully PSCA-funded projects: Major renovations, renovations of four (4) or more rooms, and all new construction as follows: buildings, additions, and athletic facilities. DCM Form 9-M must be included in the project manual of such projects. Exception: Alabama Community College System (ACCS) PSCA-funded projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.
2. PSCA plaques are not required on the following partially or fully PSCA-funded projects: Sitework, paving, parking lots, utility work, re-roofing, and finishes (such as painting). DCM Form 9-M should not be included in the project manual of such projects.
3. The erection year is the year the project is completed.
4. Guidance for determining the names of PSCA officials:
   The PSCA President is the current Governor of Alabama.
   The PSCA Vice President is the current State Superintendent of Education.
   The PSCA Secretary is the current Director of the Alabama Department of Finance.

DETAIL OF PROJECT SIGN

N.T.S.



DETAIL OF WOOD SURROUND

N.T.S.

Notes:

1. Fully locally-funded State Agency and Public University projects: DCM Form C-15 must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign.
   Fully locally-funded K-12 school projects: Project sign is not required unless requested by Owner, if project sign is requested by Owner, include DCM Form C-15 in the project manual.
   Partially or fully PSCA-funded projects: DCM Form C-15 must be included in the project manual. Contractor shall furnish and erect a project sign for all PSCA-funded projects, regardless of contract sum. "Alabama Public School and College Authority " as well as the local owner entity must be included as awarding authorities on the project sign of all PSCA-funded projects. Exception: Alabama Community College System (ACCS) PSCA-funded projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.
   Fully locally-funded ACCS projects with Notice-To-Proceeds issued prior to August 1, 2021: DCM Form C-15 must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign.
2. Sign to be constructed of ¾" exterior grade plywood.
3. Paint with two coats best grade exterior paint before letters are painted. Option: In lieu of painted lettering on plywood, a corrugated plastic sign (displaying the same lettering, layout and colors as above) may be secured directly to the unpainted exterior grade plywood.
4. Sign shall be placed in a prominent location and easily readable from existing street or roadway.
5. Sign shall be maintained in good condition until project completion.
6. Slogan: Act 2020-167's title *"Investing In Alabama's Future"* should be placed on the project signs of all PSCA-funded projects, otherwise the Awarding Authority/Owner's slogan, if any, should be used. If the Awarding Authority/Owner of a fully locally-funded project does not have a slogan, the project sign does not require a slogan.

GENERAL CONDITIONS of the CONTRACT

CONTENTS

ARTICLE 1
DEFINITIONS

Whenever the following terms, or pronouns in place of them, are used in the Contract Documents, the intent and meaning shall be interpreted as follows:

A. ALABAMA DIVISION OF CONSTRUCTION MANAGEMENT: The Technical Staff of the Alabama Division of Construction Management.

B. ARCHITECT: The Architect is the person or entity lawfully licensed to practice architecture in the State of Alabama, who is under contract with the Owner as the primary design professional for the Project and identified as the Architect in the Construction Contract. The term "Architect" means the Architect or the Architect's authorized representative. If the employment of the Architect is terminated, the Owner shall employ a new Architect whose status under the Contract Documents shall be that of the former Architect. If the primary design professional for the Project is a Professional Engineer, the term "Engineer" shall be substituted for the term "Architect" wherever it appears in this document.

C. COMMISSION: The former Alabama Building Commission, for which the Alabama Division of Construction Management has been designated by the Legislature as its successor.

D. CONTRACT: The Contract is the embodiment of the Contract Documents. The Contract represents the entire and integrated agreement between the Owner and Contractor and supersedes any prior written or oral negotiations, representations or agreements that are not incorporated into the Contract Documents. The Contract may be amended only by a Contract Change Order or a Modification to the Construction Contract. The contractual relationship which the Contract creates between the Owner and the Contractor extends to no other persons or entities. The Contract consists of the following Contract Documents, including all additions, deletions, and modifications incorporated therein before the execution of the Construction Contract:

(1) Construction Contract
(2) Performance and Payment Bonds
(3) Conditions of the Contract (General, Supplemental, and other Conditions)
(4) Specifications
(5) Drawings
(6) Contract Change Orders
(7) Modifications to the Construction Contract (applicable to PSCA Projects)

E. CONTRACT SUM: The Contract Sum is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. The term "Contract Sum" means the Contract Sum stated in the Construction Contract as may have been increased or decreased by Change Order(s) in accordance with the Contract Documents.

F. CONTRACT TIME: The Contract Time is the period of time in which the Contractor must achieve Substantial Completion of the Work. The date on which the Contract Time begins is specified in the written Notice To Proceed issued to the Contractor by the Owner or Director. The Date of Substantial Completion is the date established in accordance with Article 32. The term "Contract Time" means the Contract Time stated in the Construction Contract as may have been extended by Change Order(s) in accordance with the Contract Documents. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

G. CONTRACTOR: The Contractor is the person or persons, firm, partnership, joint venture, association, corporation, cooperative, limited liability company, or other legal entity, identified as such in the Construction Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

H. DCM: The Alabama Division of Construction Management.

I. DCM PROJECT INSPECTOR: The member of the Technical Staff of the Alabama Division of Construction Management to whom the Project is assigned relative to executing the respective inspections and authorities described in Article 16, Inspection of the Work.

J. DEFECTIVE WORK: The term "Defective Work" shall apply to: **(1)** any product, material, system, equipment, or service, or its installation or performance, which does not conform to the requirements of the Contract Documents, **(2)** in-progress or completed Work the workmanship of which does not conform to the quality specified or, if not specified, to the quality produced by skilled workers performing work of a similar nature on similar projects in the state, **(3) s**ubstitutions and deviations not properly submitted and approved or otherwise authorized, **(4)** temporary

supports, structures, or construction which will not produce the results required by the Contract Documents, and **(5)** materials or equipment rendered unsuitable for incorporation into the Work due to improper storage or protection.

K. DIRECTOR: The Director of the Alabama Division of Construction Management.

L. DRAWINGS: The Drawings are the portions of the Contract Documents showing graphically the design, location, layout, and dimensions of the Work, in the form of plans, elevations, sections, details, schedules, and diagrams.

M. NOTICE TO PROCEED: A proceed order issued by the Owner or Director, as applicable, fixing the date on which the Contractor shall begin the prosecution of the Work, which is also the date on which the Contract Time shall begin.

N.1 OWNER: The Owner is the entity or entities identified as such in the Construction Contract and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative. The term "Owner" as used herein shall be synonymous with the term "Awarding Authority".

N.2 AWARDING AUTHORITY: §39-2-1 (1) of the Code of Alabama, 1975, as amended definition: Any governmental board, commission, agency, body, authority, instrumentality, department, or subdivision of the state, its counties and municipalities. This term includes, but shall not be limited to, the Department of Transportation, the Division of Real Property Management of the Department of Finance, the State Board of Education, and any other entity contracting for public works. This term shall exclude the State Docks Department and any entity exempted from the competitive bid laws of the state by statute.

O. THE PROJECT: The Project is the total construction of which the Work required by these Contract Documents may be the entirety or only a part with other portions to be constructed by the Owner or separate contractors.

P. PROJECT MANUAL: The Project Manual is the volume usually assembled for the Work which may include the Advertisement for Bids, Instructions to Bidders, sample forms, General Conditions of the Contract, Supplementary Conditions, and Specifications of the Work.

Q. SPECIFICATIONS: The Specifications are that portion of the Contract Documents which set forth in writing the standards of quality and performance of products, equipment, materials, systems, and services and workmanship required for acceptable performance of the Work.

R. SUBCONTRACTOR: A Subcontractor is a person or entity who is undertaking the performance of any part of the Work by virtue of a contract with the Contractor. The term "Subcontractor" means a Subcontractor or its authorized representatives.

S. THE WORK: The Work is the construction and services required by the Contract Documents and includes all labor, materials, supplies, equipment, and other items and services as are necessary to produce the required construction and to fulfill the Contractor's obligations under the Contract. The Work may constitute the entire Project or only a portion of it.

ARTICLE 2
INTENT and INTERPRETATION of the CONTRACT DOCUMENTS

A. INTENT

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

B. COMPLEMENTARY DOCUMENTS

The Contract Documents are complementary. If Work is required by one Contract Document, the Contractor shall perform the Work as if it were required by all of the Contract Documents. However, the Contractor shall be required to perform Work only to the extent that is consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

C. ORDER of PRECEDENCE

Should any discrepancy arise between the various elements of the Contract Documents, precedence shall be given to them in the following order unless to do so would contravene the apparent Intent of the Contract Documents stated in preceding Paragraph A:

(1) The Construction Contract.
(2) Addenda, with those of later date having precedence over those of earlier date.
(3) Supplementary Conditions (or other Conditions which modify the General Conditions of the Contract).
(4) General Conditions of the Contract.
(5) The Specifications.
(6) Details appearing on the Drawings; large scale details shall take precedence over smaller scale details.
(7) The Drawings; large scale drawings shall take precedence over smaller scale drawings.

D. ORGANIZATION

Except as may be specifically stated within the technical specifications, neither the organization of the Specifications into divisions, sections, or otherwise, nor any arrangement of the Drawings shall control how the Contractor subcontracts portions of the Work or assigns Work to any trade.

E. INTERPRETATION

(1) The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the Intent of the Contract Documents stated in preceding Paragraph A. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as "Not In Contract" ("N.I.C."), the Contractor's obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractor's expense to produce a product or system that is complete, appropriately tested, and in operative condition ready for use or subsequent construction or operation of the Owner or separate contractors. The omission of words or phases

for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

(2) Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings unless otherwise indicated.

(3) Except as noted otherwise, references to standard specifications or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement for Bids.

(4) In the case of inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

(5) Any portions of the Contract Documents written in longhand must be initialed by all parties..

(6) Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

F. SEVERABILITY.

The partial or complete invalidity of any one or more provision of this Contract shall not affect the validity or continuing force and effect of any other provision.

ARTICLE 3
CONTRACTOR'S REPRESENTATIONS

By executing the Construction Contract the Contractor represents to the Owner:

A. The Contractor has visited the site of the Work to become familiar with local conditions under which the Work is to be performed and to evaluate reasonably observable conditions as compared with requirements of the Contract Documents.

B. The Contractor shall use its best skill and attention to perform the Work in an expeditious manner consistent with the Contract Documents.

C. The Contractor is an independent contractor and in performance of the Contract remains and shall act as an independent contractor having no authority to represent or obligate the Owner in any manner unless authorized by the Owner in writing.

ARTICLE 4
DOCUMENTS FURNISHED to CONTRACTOR

Unless otherwise provided in the Contract Documents, twenty sets of Drawings and Project Manuals will be furnished to the Contractor by the Architect without charge. Other copies requested will be furnished at reproduction cost.

ARTICLE 5
OWNERSHIP of DRAWINGS

All original or duplicated Drawings, Specifications, and other documents prepared by the Architect, and furnished to the Contractor are the property of the Architect and are to be used solely for this Project and not to be used in any manner for other work. Upon completion of the Work, all copies of Drawings and Specifications, with the exception of the Contractor's record set, shall be returned or accounted for by the Contractor to the Architect, on request.

ARTICLE 6
SUPERVISION, SUPERINTENDENT, and EMPLOYEES

A. SUPERVISION and CONSTRUCTION METHODS

(1) The term "Construction Methods" means the construction means, methods, techniques, sequences, and procedures utilized by the Contractor in performing the Work. The Contractor is solely responsible for supervising and coordinating the performance of the Work, including the selection of Construction Methods, unless the Contract Documents give other specific instructions concerning these matters.

(2) The Contractor is solely and completely responsible for job site safety, including the protection of persons and property in accordance with Article 14.

(3) The Contractor shall be responsible to the Owner for acts and omissions of not only the Contractor and its agents and employees, but all persons and entities, and their agents and employees, who are performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

(4) The Contractor shall be responsible to inspect the in-progress and completed Work to verify its compliance with the Contract Documents and to insure that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work.

B. SUPERINTENDENT

(1) The Contractor shall employ and maintain a competent level of supervision for the performance of the Work at the Project site, including a superintendent who shall:
(a) have full authority to receive instructions from the Architect or Owner and to act on those instructions and **(b)** be present at the Project site at all times during which Work is being performed.

(2) Before beginning performance of the Work, the Contractor shall notify the Architect in writing of the name and qualifications of its proposed superintendent so that the Owner may review the individual's qualifications. If, for reasonable cause, the Owner refuses to approve the individual, or withdraws its approval after once giving it, the Contractor shall name a different superintendent for the Owner's review and approval. Any disapproved superintendent will not perform in that capacity thereafter at the Project site.

C. EMPLOYEES

The Contractor shall permit only fit and skilled persons to perform the Work. The Contractor shall enforce safety procedures, strict discipline, and good order among persons performing the Work. The Contractor will remove from its employment on the Project any person who deliberately or persistently produces non-conforming Work or who fails or refuses to conform to reasonable rules of personal conduct contained in the Contract Documents or implemented by the Owner and delivered to the Contractor in writing during the course of the Work.

ARTICLE 7
REVIEW of CONTRACT DOCUMENTS and FIELD CONDITIONS by CONTRACTOR

A. In order to facilitate assembly and installation of the Work in accordance with the Contract Documents, before starting each portion of the Work, the Contractor shall examine and compare the relevant Contract Documents, and compare them to relevant field measurements made by the Contractor and any conditions at the site affecting that portion of the Work.

B. If the Contractor discovers any errors, omissions, or inconsistencies in the Contract Documents, the Contractor shall promptly report them to the Architect as a written request for information that includes a detailed statement identifying the specific Drawings or Specifications that are in need of clarification and the error, omission, or inconsistency discovered in them.

(1) The Contractor shall not be expected to act as a licensed design professional and ascertain whether the Contract Documents comply with applicable laws, statutes, ordinances, building codes, and rules and regulations, but the Contractor shall be obligated to promptly notify the Architect of any such noncompliance discovered by or made known to the Contractor. If the Contractor performs Work without fulfilling this notification obligation, the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

(2) The Contractor shall not be liable to the Owner for errors, omissions, or inconsistencies that may exist in the Contract Documents, or between the Contract Documents and conditions at the site, unless the Contractor knowingly fails to report a discovered error, omission, or inconsistency to the Architect, in which case the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

C. If the Contractor considers the Architect's response to a request for information to constitute a change to the Contract Documents involving additional costs and/or time, the Contractor shall follow the procedures of Article 20, Claims for Extra Cost or Extra Work.

D. If, with undue frequency, the Contractor requests information that is obtainable through reasonable examination and comparison of the Contract Documents, site conditions, and previous correspondence, interpretations, or clarifications, the Contractor shall be liable to the Owner for reasonable charges from the Architect for the additional services required to review, research, and respond to such requests for information.

ARTICLE 8
SURVEYS by CONTRACTOR

A. The Contractor shall provide competent engineering services to assure accurate execution of the Work in accordance with the Contract Documents. The Contractor shall verify the figures given for the contours, approaches and locations shown on the Drawings before starting any Work and be responsible for the accuracy of the finished Work. Without extra cost to the Owner, the Contractor shall engage a licensed surveyor if necessary to verify boundary lines, keep within property lines, and shall be responsible for encroachments on rights or property of public or surrounding property owners.

B. The Contractor shall establish all base lines for the location of the principal components of the Work and make all detail surveys necessary for construction, including grade stakes, batter boards and other working points, lines and elevations. If the Work involves alteration of or addition to existing structures or improvements, the Contractor shall locate and measure elements of the existing conditions as is necessary to facilitate accurate fabrication, assembly, and installation of new Work in the relationship, alignment, and/or connection to the existing structure or improvement as is shown in the Contract Documents.

ARTICLE 9
SUBMITTALS

A. Where required by the Contract Documents, the Contractor shall submit shop drawings, product data, samples and other information (hereinafter referred to as Submittals) to the Architect for the purpose of demonstrating the way by which the Contractor proposes to conform to the requirements of the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

B. The Contractor shall be responsible to the Owner for the accuracy of its Submittals and the conformity of its submitted information to the requirements of the Contract Documents. Each Submittal shall bear the Contractor's approval, evidencing that the Contractor has reviewed and found the information to be in compliance with the requirements of the Contract Documents. Submittals which are not marked as reviewed and approved by the Contractor may be returned by the Architect without action.

C. The Contractor shall prepare and deliver its submittals to the Architect sufficiently in advance of construction requirements and in a sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. In coordinating the Submittal process with its construction schedule, the Contractor shall allow sufficient time to permit adequate review by the Architect.

D. By approving a Submittal the Contractor represents not only that the element of Work presented in the Submittal complies with the requirements of the Contract Documents, but also that the Contractor has:

(1) found the layout and/or dimensions in the Submittal to be comparable with those in the Contract Documents and other relevant Submittals and has made field measurements as necessary to verify their accuracy, and
(2) determined that products, materials, systems, equipment and/or procedures presented in the Submittal are compatible with those presented, or being presented, in other relevant Submittals and

with the Contractor's intended Construction Methods.

E. The Contractor shall not fabricate or perform any portion of the Work for which the Contract Documents require Submittals until the respective Submittals have been approved by the Architect.

F. In the case of a resubmission, the Contractor shall direct specific attention to all revisions in a Submittal. The Architect's approval of a resubmission shall not apply to any revisions that were not brought to the Architect's attention.

G. If the Contract Documents specify that a Submittal is to be prepared and sealed by a registered architect or licensed engineer retained by the Contractor, all drawings, calculations, specifications, and certifications of the Submittal shall bear the Alabama seal of registration and signature of the registered/licensed design professional who prepared them or under whose supervision they were prepared. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of such a Submittal, provided that all performance and design criteria that such Submittal must satisfy are sufficiently specified in the Contract Documents. The Architect will review, approve or take other appropriate action on such a Submittal only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria specified in the Contract Documents.

H. DEVIATIONS

(1) The Architect is authorized by the Owner to approve "minor" deviations from the requirements of the Contract Documents. "Minor" deviations are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Deviations which are not "minor" may be authorized only by the Owner through the Change Order procedures of Article 19.

(2) Any deviation from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal and, in a letter transmitting the Submittal to the Architect, the Contractor shall direct the Architect's attention to, and request specific approval of, the deviation. Otherwise, the Architect's approval of a Submittal does not constitute approval of deviations from the requirements of the Contract Documents contained in the Submittal.

(3) The Contractor shall bear all costs and expenses of any changes to the Work, changes to work performed by the Owner or separate contractors, or additional services by the Architect required to accommodate an approved deviation unless the Contractor has specifically informed the Architect in writing of the required changes and a Change Order has been issued authorizing the deviation and accounting for such resulting changes and costs.

I. ARCHITECT'S REVIEW and APPROVAL

(1) The Architect will review the Contractor's Submittals for conformance with requirements of, and the design concept expressed in, the Contract Documents and will approve or take other appropriate action upon them. This review is not intended to verify the accuracy and completeness of details such as dimensions and quantities nor to substantiate installation instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor. However, the Architect shall advise the Contractor of any errors or omissions which the Architect

may detect during this review. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(2) The Architect will review and respond to all Submittals with reasonable promptness to avoid delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time to permit adequate review.

(3) No corrections or changes to Submittals indicated by the Architect will be considered as authorizations to perform Extra Work. If the Contractor considers such correction or change of a Submittal to require Work which differs from the requirements of the Contract Documents, the Contractor shall promptly notify the Architect in writing in accordance with Article 20, Claims for Extra Cost or Extra Work.

J. CONFORMANCE with SUBMITTALS

The Work shall be constructed in accordance with approved Submittals.

ARTICLE 10
DOCUMENTS and SAMPLES at the SITE

A. "AS ISSUED" SET

The Contractor shall maintain at the Project site, in good order, at least one copy of all Addenda, Change Orders, supplemental drawings, written directives and clarifications, and approved Submittals intact as issued, and an updated construction schedule.

B. "POSTED" SET

The Contractor shall maintain at the Project site, in good order, at least one set of the Drawings and Project Manual into which the Contractor has "posted"(incorporated) all Addenda, Change Orders, supplemental drawings, clarifications, and other information pertinent to the proper performance of the Work. The Contractor shall assure that all sets of the Drawings and Project Manuals being used by the Contractor, Subcontractors, and suppliers are "posted" with the current information to insure that updated Contract Documents are used for performance of the Work.

C. RECORD SET

One set of the Drawings and Project Manual described in Paragraph B shall be the Contractor's record set in which the Contractor shall record all field changes, corrections, selections, final locations, and other information as will be duplicated on the "As-built" documents required under Article 11. The Contractor shall record such "as-built" information in its record set as it becomes available through progress of the Work. The Contractor's performance of this requirement shall be subject to confirmation by the Architect at any time as a prerequisite to approval of Progress Payments.

D. The documents and samples required by this Article to be maintained at the Project site shall be readily available to the Architect, Owner, DCM Project Inspector, and their representatives.

ARTICLE 11
"AS-BUILT" DOCUMENTS

A. Unless otherwise provided in the Contract Documents, the Contractor shall deliver two (2) sets of "As-built" documents, as described herein, to the Architect for submission to the Owner upon completion of the Work. Each set of "As-built' documents shall consist of a copy of the Drawings and Project Manual, in like-new condition, into which the Contractor has neatly incorporated all Addenda, Change Orders, supplemental drawings, clarifications, field changes, corrections, selections, actual locations of underground utilities, and other information as required herein or specified elsewhere in the Contract Documents.

B. The Contractor shall use the following methods for incorporating information into the "As-built" documents:

(1) Drawings

(a) To the greatest extent practicable, information shall be carefully drawn and lettered, in ink, on the Drawings in the form of sketches, details, plans, notes, and dimensions as required to provide a fully dimensioned record of the Work. When required for clarity, sketches, details, or partial plans shall be drawn on supplemental sheets and bound into the Drawings and referenced on the drawing being revised.

(b) Where a revised drawing has been furnished by the Architect, the drawing of latest date shall be bound into the Drawings in the place of the superseded drawing.

(c) Where a supplemental drawing has been furnished by the Architect, the supplemental drawing shall be bound into the Drawings in an appropriate location and referred to by notes added to the drawing being supplemented.

(d) Where the Architect has furnished details, partial plans, or lengthy notes of which it would be impractical for the Contractor to redraw or letter on a drawing, such information may be affixed to the appropriate drawing with transparent tape if space is available on the drawing.

(e) Any entry of information made in the Drawings that is the result of an Addendum or Change Order, shall identify the Addendum or Change Order from which it originated.

(2) Project Manual

(a) A copy of all Addenda and Change Orders, excluding drawings thereof, shall be bound in the front of the Project Manual.

(b) Where a document, form, or entire specification section is revised, the latest issue shall be bound into the Project Manual in the place of the superseded issue.

(c) Where information within a specification section is revised, the deleted or revised information shall be drawn through in ink and an adjacent note added identifying the Addendum or Change Order containing the revised information.

C. Within ten days after the Date of Substantial Completion of the Work, or the last completed portion of the Work, the Contractor shall submit the "As-built" documents to the Architect for approval. If the Architect requires that any corrections be made, the documents will be returned in a reasonable time for correction and resubmission.

ARTICLE 12
PROGRESS SCHEDULE

(Not applicable if the Contract Time is 60 days or less.)

A. The Contractor shall within fifteen days after the date of commencement stated in the Notice to Proceed, or such other time as may be provided in the Contract Documents, prepare and submit to the Architect for review and approval a practicable construction schedule informing the Architect and Owner of the order in which the Contractor plans to carry on the Work within the Contract Time. The Architect's review and approval of the Contractor's construction schedule shall be only for compliance with the specified format, Contract Time, and suitability for monitoring progress of the Work and shall not be construed as a representation that the Architect has analyzed the schedule to form opinions of sequences or durations of time represented in the schedule.

B. If a schedule format is not specified elsewhere in the Contract Documents, the construction schedule shall be prepared using DCM Form C-11, "Sample Progress Schedule and Report", (contained in the Project Manual) or similar format of suitable scale and detail to indicate the percentage of Work scheduled to be completed at the end of each month. At the end of each month the Contractor shall enter the actual percentage of completion on the construction schedule submit two copies to the Architect, and attach one copy to each copy of the monthly Application for Payment. The construction schedule shall be revised to reflect any agreed extensions of the Contract Time or as required by conditions of the Work.

C. If a more comprehensive schedule format is specified elsewhere in the Contract Documents or voluntarily employed by the Contractor, it may be used in lieu of DCM Form C-11.

D. The Contractor's construction schedule shall be used by the Contractor, Architect, and Owner to determine the adequacy of the Contractor's progress. The Contractor shall be responsible for maintaining progress in accordance with the currently approved construction schedule and shall increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant and equipment as may be necessary to do so. If the Contractor's progress falls materially behind the currently approved construction schedule and, in the opinion of the Architect or Owner, the Contractor is not taking sufficient steps to regain schedule, the Architect may, with the Owner's concurrence, issue the Contractor a Notice to Cure pursuant to Article 27. In such a Notice to Cure the Architect may require the Contractor to submit such supplementary or revised construction schedules as may be deemed necessary to demonstrate the manner in which schedule will be regained.

ARTICLE 13
EQUIPMENT, MATERIALS, and SUBSTITUTIONS

A. Every part of the Work shall be executed in a workmanlike manner in accordance with the Contract Documents and approved Submittals. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work and shall be new except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise.

B. Whenever a product, material, system, item of equipment, or service is identified in the Contract Documents by reference to a trade name, manufacturer's name, model number, etc.(hereinafter

referred to as "source"), and only one or two sources are listed, or three or more sources are listed and followed by "or approved equal" or similar wording, it is intended to establish a required standard of performance, design, and quality, and the Contractor may submit, for the Architect's approval, products, materials, systems, equipment, or services of other sources which the Contractor can prove to the Architect's satisfaction are equal to, or exceed, the standard of performance, design and quality specified, unless the provisions of Paragraph D below apply. Such proposed substitutions are not to be purchased or installed without the Architect's written approval of the substitution.

C. If the Contract Documents identify three or more sources for a product, material, system, item of equipment or service to be used and the list of sources is not followed by "or approved equal" or similar wording, the Contractor may make substitution only after evaluation by the Architect and execution of an appropriate Contract Change Order.

D. If the Contract Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the Contractor must furnish the identified sole source.

ARTICLE 14
SAFETY and PROTECTION of PERSONS and PROPERTY

A. The Contractor shall be solely and completely responsible for conditions at the Project site, including safety of all persons (including employees) and property. The Contractor shall create, maintain, and supervise conditions and programs to facilitate and promote safe execution of the Work, and shall supervise the Work with the attention and skill required to assure its safe performance. Safety provisions shall conform to OSHA requirements and all other federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. Nothing contained in this Contract shall be construed to mean that the Owner has employed the Architect nor has the Architect employed its consultants to administer, supervise, inspect, or take action regarding safety programs or conditions at the Project site.

B. The Contractor shall employ Construction Methods, safety precautions, and protective measures that will reasonably prevent damage, injury or loss to:

(1) workers and other persons on the Project site and in adjacent and other areas that may be affected by the Contractor's operations;

(2) the Work and materials and equipment to be incorporated into the Work and stored by the Contractor on or off the Project site; and

(3) other property on, or adjacent to, the Project site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and other improvements not designated in the Contract Documents to be removed, relocated, or replaced.

C. The Contractor shall be responsible for the prompt remedy of damage and loss to property, including the filing of appropriate insurance claims, caused in whole or in part by the fault or negligence of the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

D. The Contractor shall comply with and give notices required by applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety and protection of persons or property, including without limitation notices to adjoining property owners of excavation or other construction activities that potentially could cause damage or injury to adjoining property or persons thereon.

E. The Contractor shall erect and maintain barriers, danger signs, and any other reasonable safeguards and warnings against hazards as may be required for safety and protection during performance of the Contract and shall notify owners and users of adjacent sites and utilities of conditions that may exist or arise which may jeopardize their safety.

F. If use or storage of explosives or other hazardous materials or equipment or unusual Construction Methods are necessary for execution of the Work, the Contractor shall exercise commensurate care and employ supervisors and workers properly qualified to perform such activity.

G. The Contractor shall furnish a qualified safety representative at the Project site whose duties shall include the prevention of accidents. The safety representative shall be the Contractor's superintendent, unless the Contractor assigns this duty to another responsible member of its on-site staff and notifies the Owner and Architect in writing of such assignment.

H. The Contractor shall not permit a load to be applied, or forces introduced, to any part of the construction or site that may cause damage to the construction or site or endanger safety of the construction, site, or persons on or near the site.

I. The Contractor shall have the right to act as it deems appropriate in emergency situations jeopardizing life or property. The Contractor shall be entitled to equitable adjustment of the Contract Sum or Contract Time for its efforts expended for the sole benefit of the Owner in an emergency. Such adjustment shall be determined as provided in Articles 19 and 20.

J. The duty of the Architect and the Architect's consultants to visit the Project site to conduct periodic inspections of the Work or for other purposes shall not give rise to a duty to review or approve the adequacy of the Contractor's safety program, safety supervisor, or any safety measure which Contractor takes or fails to take in, on, or near the Project site.

ARTICLE 15
HAZARDOUS MATERIALS

A. A Hazardous Material is any substance or material identified as hazardous under any federal, state, or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing its handling, disposal, and/or clean-up. Existing Hazardous Materials are Hazardous Materials discovered at the Project site and not introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

B. If, during the performance of the Work, the Contractor encounters a suspected Existing Hazardous Material, the Contractor shall immediately stop work in the affected area, take measures appropriate to the condition to keep people away from the suspected Existing Hazardous Material, and

immediately notify the Architect and Owner of the condition in writing.

C. The Owner shall obtain the services of an independent laboratory or professional consultant, appropriately licensed and qualified, to determine whether the suspected material is a Hazardous Material requiring abatement and, if so, to certify after its abatement that it has been rendered harmless. Any abatement of Existing Hazardous Materials will be the responsibility of the Owner. The Owner will advise the Contractor in writing of the persons or entities who will determine the nature of the suspected material and those who will, if necessary, perform the abatement. The Owner will not employ persons or entities to perform these services to whom the Contractor or Architect has reasonable objection.

D. After certification by the Owner's independent laboratory or professional consultant that the material is harmless or has been rendered harmless, work in the affected area shall resume upon written agreement between the Owner and Contractor. If the material is found to be an Existing Hazardous Material and the Contractor incurs additional cost or delay due to the presence and abatement of the material, the Contract Sum and/or Contract Time shall be appropriately adjusted by a Contract Change Order pursuant to Article 19.

E. The Owner shall not be responsible for Hazardous Materials introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable unless such Hazardous Materials were required by the Contract Documents.

ARTICLE 16
INSPECTION of the WORK

A. GENERAL

(1) The Contractor is solely responsible for the Work's compliance with the Contract Documents; therefore, the Contractor shall be responsible to inspect in-progress and completed Work, and shall verify its compliance with the Contract Documents and that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work. Neither the presence nor absence of inspections by the Architect, Owner, Director, DCM Project Inspector, any public authority having jurisdiction, or their representatives shall relieve the Contractor of responsibility to inspect the Work, for responsibility for Construction Methods and safety precautions and programs in connection with the Work, or from any other requirement of the Contract Documents.

(2) The Architect, Owner, Director, DCM Project Inspector, any public authority having jurisdiction, and their representatives shall have access at all times to the Work for inspection whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. All materials, workmanship, processes of manufacture, and methods of construction, if not otherwise stipulated in the Contract Documents, shall be subject to inspection, examination, and test at any and all places where such manufacture and/or construction are being carried on. Such inspections will not unreasonably interfere with the Contractor's operations.

(3) The Architect will inspect the Work as a representative of the Owner. The Architect's inspections may be supplemented by inspections by the DCM Project Inspector as a representative of the Alabama Division of Construction Management.

(4) The Contractor may be charged by the Owner for any extra cost of inspection incurred by the Owner or Architect on account of material and workmanship not being ready at the time of inspection set by the Contractor.

B. TYPES of INSPECTIONS

(1) SCHEDULED INSPECTIONS and CONFERENCES. Scheduled Inspections and Conferences are conducted by the Architect, scheduled by the Architect in coordination with the Contractor and DCM Project Inspector, and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers, and the DCM Project Inspector. Scheduled Inspections and Conferences of this Contract include:

(a) Pre-construction Conference.

(b) Pre-roofing Conference (not applicable if the Contract involves no roofing work)

(**c) Above Ceiling Inspection(s)**: An above ceiling inspection of all spaces in the building is required before the ceiling material is installed. Above ceiling inspections are to be conducted at a time when all above ceiling systems are complete and tested to the greatest extent reasonable pending installation of the ceiling material. System identifications and markings are to be complete. All fire-rated construction including fire-stopping of penetrations and specified identification above the ceiling shall be complete. Ceiling framing and suspension systems shall be complete with lights, grilles and diffusers, access panels, fire protection drops for sprinkler heads, etc., installed in their final locations to the greatest extent reasonable. Above ceiling framing to support ceiling mounted equipment shall be complete. The above ceiling construction shall be complete to the extent that after the inspection the ceiling material can be installed without disturbance.

(**d) Final Inspection(s):** A Final Inspection shall establish that the Work, or a designated portion of the Work, is Substantially Complete in accordance with Article 32 and is accepted by the Architect, Owner, and DCM Project Inspector as being ready for the Owner's occupancy or use. At the conclusion of this inspection, items requiring correction or completion ("punch list" items) shall be minimal and require only a short period of time for accomplishment to establish Final Acceptance of the Work. If the Work, or designated portion of the Work, includes the installation, or modification, of a fire alarm system or other life safety systems essential to occupancy, such systems shall have been tested and appropriately certified before the Final Inspection.

(**e) Year-end Inspection(s):** An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one year warranty period(s). The subsequent delivery of the Architect's report of this inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period in accordance with Article 35.

(2) PERIODIC INSPECTIONS. Periodic Inspections are conducted throughout the course of the Work by the Architect, the Architect's consultants, their representatives, and the DCM Project Inspector, jointly or independently, with or without advance notice to the Contractor.

(3) SPECIFIED INSPECTIONS and TESTS. Specified Inspections and Tests include inspections, tests, demonstrations, and approvals that are either specified in the Contract Documents or required by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction, to be performed by the Contractor, one of its Subcontractors, or an independent testing laboratory or firm (whether paid for by the Contractor or Owner).

C. INSPECTIONS by the ARCHITECT

(1) The Architect is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations as defined in Article 9 and "minor" changes as defined in Article 19), to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner.

(2) The Architect will visit the site at intervals appropriate to the stage of the Contractor's operations and as otherwise necessary to:

(a) become generally familiar with the in-progress and completed Work and the quality of the Work,

(b) determine whether the Work is progressing in general accordance with the Contractor's schedule and is likely to be completed within the Contract Time,

(c) visually compare readily accessible elements of the Work to the requirements of the Contract Documents to determine, in general, if the Contractor's performance of the Work indicates that the Work will conform to the requirements of the Contract Documents when completed,

(d) endeavor to guard the Owner against Defective Work,

(e) review and address with the Contractor any problems in implementing the requirements of the Contract Documents that the Contractor may have encountered, and

(f) keep the Owner fully informed about the Project.

(3) The Architect shall have the authority to reject Defective Work or require its correction, but shall not be required to make exhaustive investigations or examinations of the in-progress or completed portions of the Work to expose the presence of Defective Work. However, it shall be an obligation of the Architect to report in writing, to the Owner, Contractor, and DCM Project Inspector, any Defective Work recognized by the Architect.

(4) The Architect shall have the authority to require the Contractor to stop work only when, in the Architect's reasonable opinion, such stoppage is necessary to avoid Defective Work. The Architect shall not be liable to the Contractor or Owner for the consequences of any decisions made by the Architect in good faith either to exercise or not to exercise this authority.

(5) "Inspections by the Architect" includes appropriate inspections by the Architect's consultants as dictated by their respective disciplines of design and the stage of the Contractor's operations.

D. INSPECTIONS by the DCM PROJECT INSPECTOR

(1) The DCM Project Inspector will:

(a) participate in scheduled inspections and conferences as practicable,

(b) perform periodic inspections of in-progress and completed Work to ensure code compliance of the Project and general conformance of the Work with the Contract Documents, and

(c) monitor the Contractor's progress and performance of the Work.

(2) The DCM Project Inspector shall have the authority to:

(a) reject Work that is not in compliance with the State Building Code adopted by the DCM, unless the Work is in accordance with the Contract Documents in which case the DCM Project Inspector will advise the Architect to initiate appropriate corrective action, and

(b) notify the Architect, Owner, and Contractor of Defective Work recognized by the DCM Project Inspector.

(3) The DCM Project Inspector's periodic inspections will usually be scheduled around key stages of construction based upon information reported by the Architect. As the Architect or Owner deems appropriate, the DCM Project Inspector, as well as other members of the Technical Staff, can be requested to schedule special inspections or meetings to address specific matters. The written findings of DCM Project Inspector will be transmitted to the Owner, Contractor, and Architect.

(4) The DCM Project Inspector is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents, to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner. The Contractor shall not proceed with Work as a result of instructions or findings of the DCM Project Inspector which the Contractor considers to be a change to the requirements of the Contract Documents without written authorization of the Owner through the Architect.

E. UNCOVERING WORK

(1) If the Contractor covers a portion of the Work before it is examined by the Architect and this is contrary to the Architect's request or specific requirements in the Contract Documents, then, upon written request of the Architect, the Work must be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

(2) Without a prior request or specific requirement that Work be examined by the Architect before it is covered, the Architect may request that Work be uncovered for examination and the Contractor shall uncover it. If the Work is in accordance with the Contract Documents, the Contract Sum shall be equitably adjusted under Article 19 to compensate the Contractor for the costs of uncovering and replacement. If the Work is not in accordance with the Contract Documents, uncovering, correction, and replacement shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

F. SPECIFIED INSPECTIONS and TESTS

(1) The Contractor shall schedule and coordinate Specified Inspections and Tests to be made at appropriate times so as not to delay the progress of the Work or the work of the Owner or separate contractors. If the Contract Documents require that a Specified Inspection or Test be witnessed or attended by the Architect or Architect's consultant, the Contractor shall give the Architect timely notice of the time and place of the Specified Inspection or Test. If a Specified Inspection or Test reveals that Work is not in compliance with requirements of the Contract Documents, the Contractor shall bear the costs of correction, repeating the Specified Inspection or Test, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services. Through appropriate Contract Change Order the Owner shall bear costs of tests, inspections or approvals which become Contract requirements subsequent to the receipt of bids.

(2) If the Architect, Owner, or public authority having jurisdiction determines that inspections, tests, demonstrations, or approvals in addition to Specified Inspections and Tests are required, the Contractor shall, upon written instruction from the Architect, arrange for their performance by an entity acceptable to the Owner, giving timely notice to the architect of the time and place of their performance. Related costs shall be borne by the Owner unless the procedures reveal that Work is not in compliance with requirements of the Contract Documents, in which case the Contractor shall

bear the costs of correction, repeating the procedures, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services.

(3) Unless otherwise required by the Contract Documents, required certificates of Specified Inspections and Tests shall be secured by the Contractor and promptly delivered to the Architect.

(4) Failure of any materials to pass Specified Inspections and Tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material for use in the Work.

ARTICLE 17
CORRECTION of DEFECTIVE WORK

A. The Contractor shall, at the Contractor's expense, promptly correct Defective Work rejected by the Architect or which otherwise becomes known to the Contractor, removing the rejected or nonconforming materials and construction from the project site.

B. Correction of Defective Work shall be performed in such a timely manner as will avoid delay of completion, use, or occupancy of the Work and the work of the Owner and separate contractors.

C. The Contractor shall bear all expenses related to the correction of Defective Work, including but not limited to: **(1)** additional testing and inspections, including repeating Specified Inspections and Tests**, (2)** reasonable services and expenses of the Architect, and **(3)** the expense of making good all work of the Contractor, Owner, or separate contractors destroyed or damaged by the correction of Defective Work.

ARTICLE 18
DEDUCTIONS for UNCORRECTED WORK

If the Owner deems it advisable and in the Owner's interest to accept Defective Work, the Owner may allow part or all of such Work to remain in place, provided an equitable deduction from the Contract Sum, acceptable to the Owner, is offered by the Contractor.

ARTICLE 19
CHANGES in the WORK

A. GENERAL

(1) The Owner may at any time direct the Contractor to make changes in the Work which are within the general scope of the Contract, including changes in the Drawings, Specifications, or other portions of the Contract Documents to add, delete, or otherwise revise portions of the Work. The Architect is authorized by the Owner to direct "minor" changes in the Work by written order to the Contractor. "Minor" changes in the Work are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Changes in the Work which are not "minor" may be authorized only by the Owner.

(2) If the Owner directs a change in the Work, the change shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract, stating their agreement upon the change or changes in the Work and the adjustments, if any, in the Contract Sum and the Contract Time.

(3) Subject to compliance with Alabama's Public Works Law, the Owner may, upon agreement by the Contractor, incorporate previously unawarded bid alternates into the Contract.

(4) In the event of a claim or dispute as to the appropriate adjustment to the Contract Sum or Contract Time due to a directive to make changes in the Work, the Work shall proceed as provided in this article subject to subsequent agreement of the parties or final resolution of the dispute pursuant to Article 24.

(5) Consent of surety will be obtained for all Contract Change Orders involving an increase in the Contract Sum.

(6) Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly to perform changes in the Work, unless otherwise directed by the Owner through the Architect.

(7) All change orders require DCM Form C-12: Contract Change Order and DCM Form B-11: Change Order Justification. Only Change Orders 10% or greater of the current contract amount require the Owner's legal advisor's signature on DCM Form B-11: Change Order Justification.

B. DETERMINATION of ADJUSTMENT of the CONTRACT SUM

The adjustment of the Contract Sum resulting from a change in the Work shall be determined by one of the following methods, or a combination thereof, as selected by the Owner:

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. **Changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

(2) Unit Price. By application of Unit Prices included in the Contract or subsequently agreed to by the parties. However, if the character or quantity originally contemplated is materially changed so that application of such unit price to quantities of Work proposed will cause substantial inequity to either party, the applicable unit price shall be equitably adjusted.

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with

sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

(a) costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under Contractor's or Subcontractor's standard personnel policy;

(b) cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;

(c) rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;

(d) costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;

(e) reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and

(f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. **Changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

C. ADJUSTMENT of the CONTRACT TIME due to CHANGES

(1) Unless otherwise provided in the Contract Documents, the Contract Time shall be equitably adjusted for the performance of a change provided that the Contractor notifies the Architect in writing that the change will increase the time required to complete the Work. Such notice shall be provided no later than:

(a) with the Contractor's cost proposal stating the number of days of extension requested, or

(b) within ten days after the Contractor receives a directive to proceed with a change in advance of submitting a cost proposal, in which case the notice should provide an estimated number of days of extension to be requested, which may be subject to adjustment in the cost proposal.

(2) The Contract Time shall be extended only to the extent that the change affects the time required to complete the entire Work of the Contract, taking into account the concurrent performance of the changed and unchanged Work.

D. CHANGE ORDER PROCEDURES

(1) If the Owner proposes to make a change in the Work, the Architect will request that the Contractor provide a cost proposal for making the change to the Work. The request shall be in writing and shall adequately describe the proposed change using drawings, specifications, narrative, or a combination thereof. Within 21 days after receiving such a request, or such other time as may be stated in the request, the Contractor shall prepare and submit to the Architect a written proposal, properly itemized and supported by sufficient substantiating data to facilitate evaluation. The stated time within which the Contractor must submit a proposal may be extended if, within that time, the Contractor makes a written request with reasonable justification thereof.

(2) The Contractor may voluntarily offer a change proposal which, in the Contractor's opinion, will reduce the cost of construction, maintenance, or operation or will improve the cost-effective performance of an element of the Project, in which case the Owner, through the Architect, will accept, reject, or respond otherwise within 21 days after receipt of the proposal, or such other reasonable time as the Contractor may state in the proposal.

(3) If the Contractor's proposal is acceptable to the Owner, or is negotiated to the mutual agreement of the Contractor and Owner, the Architect will prepare an appropriate Contract Change Order for execution. Upon receipt of the fully executed Contract Change Order, the Contractor shall proceed with the change.

(4) In advance of delivery of a fully executed Contract Change Order, the Architect may furnish to the Contractor a written authorization to proceed with an agreed change. However, such an authorization shall be effective only if it:

(a) identifies the Contractor's accepted or negotiated proposal for the change,
(b) states the agreed adjustments, if any, in Contract Sum and Contract Time,
(c) states that funds are available to pay for the change, and
(d) is signed by the Owner.

(5) If the Contractor and Owner cannot agree on the amount of the adjustment in the Contract Sum for a change, the Owner, through the Architect, may order the Contractor to proceed with the change on a Force Account basis, but the net cost to the Owner shall not exceed the amount quoted in the Contractor's proposal. Such order shall state that funds are available to pay for the change.

(6) If the Contractor does not promptly respond to a request for a proposal, or the Owner determines that the change is essential to the final product of the Work and that the change must be effected immediately to avoid delay of the Project, the Owner may:

(a) determine with the Contractor a sufficient maximum amount to be authorized for the change and
(b) direct the Contractor to proceed with the change on a Force Account basis pending delivery of the Contractor's proposal, stating the maximum increase in the Contract Sum that is authorized for the change.

(7) Pending agreement of the parties or final resolution of any dispute of the total amount due the Contractor for a change in the Work, amounts not in dispute for such changes in the Work may be included in Applications for Payment accompanied by an interim Change Order indicating the parties' agreement with part of all of such costs or time extension. Once a dispute is resolved, it shall be implemented by preparation and execution of an appropriate Change Order.

ARTICLE 20
CLAIMS for EXTRA COST or EXTRA WORK

A. If the Contractor considers any instructions by the Architect, Owner, DCM Project Inspector, or public authority having jurisdiction to be contrary to the requirements of the Contract Documents and will involve extra work and/or cost under the Contract, the Contractor shall give the Architect written notice thereof within ten days after receipt of such instructions, and in any event before proceeding to execute such work. As used in this Article, "instructions" shall include written or

oral clarifications, directions, instructions, interpretations, or determinations.

B. The Contractor's notification pursuant to Paragraph 20.A shall state: (1) the date, circumstances, and source of the instructions, **(2)** that the Contractor considers the instructions to constitute a change to the Contract Documents and why, and **(3)** an estimate of extra cost and time that may be involved to the extent an estimate may be reasonably made at that time.

C. Except for claims relating to an emergency endangering life or property, no claim for extra cost or extra work shall be considered in the absence of prior notice required under Paragraph 20.A.

D. Within ten days of receipt of a notice pursuant to Paragraph 20.A, the Architect will respond in writing to the Contractor, stating one of the following:

(1) The cited instruction is rescinded.

(2) The cited instruction is a change in the Work and in which manner the Contractor is to proceed with procedures of Article 19, Changes in the Work.

(3) The cited instruction is reconfirmed, is not considered by the Architect to be a change in the Contract Documents, and the Contractor is to proceed with Work as instructed.

E. If the Architect's response to the Contractor is as in Paragraph 20.D(3), the Contractor shall proceed with the Work as instructed. If the Contractor continues to consider the instructions to constitute a change in the Contract Documents, the Contractor shall, within ten days after receiving the Architect's response, notify the Architect in writing that the Contractor intends to submit a claim pursuant to Article 24, Resolution of Claims and Disputes

ARTICLE 21
DIFFERING SITE CONDITIONS

A. DEFINITION

"Differing Site Conditions" are:

(1) subsurface or otherwise concealed physical conditions at the Project site which differ materially from those indicated in the Contract Documents, or

(2) unknown physical conditions at the Project site which are of an unusual nature, differing materially from conditions ordinarily encountered and generally recognized as inherent in construction activities of the character required by the Contract Documents.

B. PROCEDURES

If Differing Site Conditions are encountered, then the party discovering the condition shall promptly notify the other party before the condition is disturbed and in no event later than ten days after discovering the condition. Upon such notice and verification that a Differing Site Condition exists, the Architect will, with reasonable promptness and with the Owner's concurrence, make changes in the Drawings and/or Specifications as are deemed necessary to conform to the Differing Site Condition. Any increase or decrease in the Contract Sum or Contract Time that is warranted by the changes will be made as provided under Article 19, Changes in the Work. If the Architect determines a Differing Site Condition has not been encountered, the Architect shall notify the

Owner and Contractor in writing, stating the reason for that determination.

ARTICLE 22
CLAIMS for DAMAGES

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time after the discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

ARTICLE 23
DELAYS

A. A delay beyond the Contractor's control at any time in the commencement or progress of Work by an act or omission of the Owner, Architect, or any separate contractor or by labor disputes, unusual delay in deliveries, unavoidable casualties, fires, abnormal floods, tornadoes, or other cataclysmic events of nature, may entitle the Contractor to an extension of the Contract Time provided, however, that the Contractor shall, within ten days after the delay first occurs, give written notice to the Architect of the cause of the delay and its probable effect on progress of the entire Work.

B. Adverse weather conditions that are more severe than anticipated for the locality of the Work during any given month may entitle the Contractor to an extension of Contract Time provided, however;

(1) the weather conditions had an adverse effect on construction scheduled to be performed during the period in which the adverse weather occurred, which in reasonable sequence would have an effect on completion of the entire Work,

(2) the Contractor shall, within twenty-one days after the end of the month in which the delay occurs, give the Architect written notice of the delay that occurred during that month and its probable effect on progress of the Work, and

(3) within a reasonable time after giving notice of the delay, the Contractor provides the Architect with sufficient data to document that the weather conditions experienced were unusually severe for the locality of the Work during the month in question. Unless otherwise provided in the Contract Documents, data documenting unusually severe weather conditions shall compare actual weather conditions to the average weather conditions for the month in question during the previous five years as recorded by the National Oceanic and Atmospheric Administration (NOAA) or similar record-keeping entities.

C. Adjustments, if any, of the Contract Time pursuant to this Article shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract or, at closeout of the Contract, by mutual written agreement between the Contractor and Owner. The adjustment of the Contract Time shall not exceed the extent to which the delay extends the time required to complete the entire Work of the Contract.

D. The Contractor shall not be entitled to any adjustment of the Contract Sum for damage due to delays claimed pursuant to this Article unless the delay was caused by the Owner or Architect and was either:

(1) the result of bad faith or active interference or

(2) beyond the contemplation of the parties and not remedied within a reasonable time after notification by the Contractor of its presence.

ARTICLE 24
RESOLUTION of CLAIMS and DISPUTES

A. APPLICABILITY of ARTICLE

(1) As used in this Article, "Claims and Disputes" include claims or disputes asserted by the Contractor, its Surety, or Owner arising out of or related to the Contract, or its breach, including without limitation claims seeking, under the provisions of the Contract, equitable adjustment of the Contract Sum or Contract Time and claims and disputes arising between the Contractor (or its Surety) and Owner regarding interpretation of the Contract Documents, performance of the Work, or breach of or compliance with the terms of the Contract.

(2) "Resolution" addressed in this Article applies only to Claims and Disputes arising between the Contractor (or its Surety) and Owner and asserted after execution of the Construction Contract and prior to the date upon which final payment is made. Upon making application for final payment the Contractor may reserve the right to subsequent Resolution of existing Claims by including a list of all Claims, in stated amounts, which remain to be resolved and specifically excluding them from any release of claims executed by the Contractor, and in that event Resolution may occur after final payment is made.

B. CONTINUANCE of PERFORMANCE

An unresolved Claim or Dispute shall not be just cause for the Contractor to fail or refuse to proceed diligently with performance of the Contract or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

C. GOOD FAITH EFFORT to SETTLE

The Contractor and Owner agree that, upon the assertion of a Claim by the other, they will make a good faith effort, with the Architect's assistance and advice, to achieve mutual resolution of the Claim. If mutually agreed, the Contractor and Owner may endeavor to resolve a Claim through mediation. If efforts to settle are not successful, the Claim shall be resolved in accordance with paragraph D or E below, whichever applies.

D FINAL RESOLUTION for STATE-FUNDED CONTRACTS

(1) If the Contract is funded in whole or in part with state funds, the final Resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner shall be by the Director, whose decision shall be final, binding, and conclusive upon the Contractor, its Surety, and the Owner.

(2) When it becomes apparent to the party asserting a Claim (the Claimant) that an impasse to mutual resolution has been reached, the Claimant may request in writing to the Director that the Claim be resolved by decision of the Director. Such request by the Contractor (or its Surety) shall be submitted through the Owner. Should the Owner fail or refuse to submit the Contractor's request within ten days of receipt of same, the Contractor may forward such request directly to the Director. Upon receipt of a request to resolve a Claim, the Director will instruct the parties as to procedures to be initiated and followed.

(3) If the respondent to a Claim fails or refuses to participate or cooperate in the Resolution procedures to the extent that the Claimant is compelled to initiate legal proceedings to induce the Respondent to participate or cooperate, the Claimant will be entitled to recover, and may amend its Claim to include, the expense of reasonable attorney's fees so incurred.

E. FINAL RESOLUTION for LOCALLY-FUNDED CONTRACTS

If the Contract is funded in whole with funds provided by a city or county board of education or other local governmental authority and the Contract Documents do not stipulate a binding alternative dispute resolution method, the final resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner may be by any legal remedy available to the parties. Alternatively, upon the written agreement of the Contractor (or its Surety) and the Owner, final Resolution of Claims and Disputes may be by submission to binding arbitration before a neutral arbitrator or panel or by submission to the Director in accordance with preceding Paragraph D.

ARTICLE 25
OWNER'S RIGHT to CORRECT DEFECTIVE WORK

If the Contractor fails or refuses to correct Defective Work in a timely manner that will avoid delay of completion, use, or occupancy of the Work or work by the Owner or separate contractors, the Architect may give the Contractor written Notice to Cure the Defective Work within a reasonable, stated time. If within ten days after receipt of the Notice to Cure the Contractor has not proceeded and satisfactorily continued to cure the Defective Work or provided the Architect with written verification that satisfactory positive action is in process to cure the Defective Work, the Owner may, without prejudice to any other remedy available to the Owner, correct the Defective Work and deduct the actual cost of the correction from payment then or thereafter due to the Contractor.

ARTICLE 26
OWNER'S RIGHT to STOP or SUSPEND the WORK

A. STOPPING the WORK for CAUSE

If the Contractor fails to correct Defective Work or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may direct the Contractor in writing to stop the Work, or any part of the Work, until the cause for the Owner's directive has been eliminated; however, the Owner's right to stop the Work shall not be construed as a duty of the Owner to be exercised for the benefit of the Contractor or any other person or entity.

B. SUSPENSION by the OWNER for CONVENIENCE

(1) The Owner may, at any time and without cause, direct the Contractor in writing to suspend, delay or interrupt the Work, or any part of the Work, for a period of time as the Owner may determine.

(2) The Contract Sum and Contract Time shall be adjusted, pursuant to Article 19, for reasonable increases in the cost and time caused by an Owner-directed suspension, delay or interruption of Work for the Owner's convenience. However, no adjustment to the Contract Sum shall be made to the extent that the same or concurrent Work is, was or would have been likewise suspended, delayed or interrupted for other reasons not caused by the Owner.

ARTICLE 27
OWNER'S RIGHT to TERMINATE CONTRACT

A. TERMINATION by the OWNER for CAUSE

(1) Causes: The Owner may terminate the Contractor's right to complete the Work, or any designated portion of the Work, if the Contractor:

(a) should be adjudged bankrupt, or should make a general assignment for the benefit of the Contractor's creditors, or if a receiver should be appointed on account of the Contractor's insolvency to the extent termination for these reasons is permissible under applicable law;

(b) refuses or fails to prosecute the Work, or any part of the Work, with the diligence that will insure its completion within the Contract Time, including any extensions, or fails to complete the Work within the Contract Time;

(c) refuses or fails to perform the Work, including prompt correction of Defective Work, in a manner that will insure that the Work, when fully completed, will be in accordance with the Contract Documents;

(d) fails to pay for labor or materials supplied for the Work or to pay Subcontractors in accordance with the respective Subcontract;

(e) persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction, or the instructions of the Architect or Owner; or

(f) is otherwise guilty of a substantial breach of the Contract.

(2) Procedure for Unbonded Construction Contracts (Generally, contracts less than $100,000):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor written notice to cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor written notice that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a seven day Notice of Termination

without giving the Contractor another Notice to Cure.

(d) At the expiration of the seven days of the termination notice, the Owner may:

.1 take possession of the site, of all materials and equipment stored on and off site, and of all Contractor-owned tools, construction equipment and machinery, and facilities located at the site, and

.2 finish the Work by whatever reasonable method the Owner may deem expedient.

(e) The Contractor shall not be entitled to receive further payment under the Contract until the Work is completed.

(f) If the Owner's cost of completing the Work, including correction of Defective Work, compensation for additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees due to the default and termination, is less than the unpaid balance of the Contract Sum, the excess balance less liquidated damages for delay shall be paid to the Contractor. If such cost to the Owner including attorney's fees, plus liquidated damages, exceeds the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner. Final Resolution of any claim or Dispute involving the termination or any amount due any party as a result of the termination shall be pursuant to Article 24.

(g) Upon the Contractor's request, the Owner shall furnish to the Contractor a detailed accounting of the Owner's cost of completing the Work.

(3) Procedure for Bonded Construction Contracts (Generally, contracts of $100,000 or more):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor and its Surety written Notice to Cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor and its Surety written notice declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a Notice of Termination without giving the Contractor another Notice to Cure.

(d) Demand on the Performance Bond: With the Notice of Termination the Owner shall give the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation to take charge of and complete the Work in accordance with the terms of the Performance Bond.

(e) Surety Claims: Upon receiving the Owner's demand on the Performance Bond, the Surety shall assume all rights and obligations of the Contractor under the Contract. However, the Surety shall also have the right to assert "Surety Claims" to the Owner, which are defined as claims relating to acts or omissions of the Owner or Architect prior to termination of the Contractor which may have prejudiced its rights as Surety or its interest in the unpaid balance of the Contract Sum. If the Surety wishes to assert a Surety Claim, it shall give the Owner, through the Architect, written notice within twenty-one days after first recognizing the condition giving rise to the Surety Claim. The Surety Claim shall then be submitted to the Owner, through the Architect, no later than sixty days after giving notice thereof, but no such Surety Claims shall be considered if submitted after the date upon which final payment

becomes due. Final resolution of Surety Claims shall be pursuant to Article 24, Resolution of Claims and Disputes. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

(f) Payments to Surety: The Surety shall be paid for completing the Work in accordance with the Contract Documents as if the Surety were the Contractor. The Owner shall have the right to deduct from payments to the Surety any reasonable costs incurred by the Owner, including compensation for additional architectural, engineering, managerial, and administrative services, and attorneys' fees as necessitated by termination of the Contractor and completion of the Work by the Surety. No further payments shall be made to the Contractor by the Owner. The Surety shall be solely responsible for any accounting to the Contractor for the portion of the Contract Sum paid to Surety by Owner or for the costs and expenses of completing the Work.

(4) Wrongful Termination: If any notice of termination by the Owner for cause, made in good faith, is determined to have been wrongly given, such termination shall be effective and compensation therefore determined as if it had been a termination for convenience pursuant to Paragraph B below.

B. TERMINATION by the OWNER for CONVENIENCE

(1) The Owner may, without cause and at any time, terminate the performance of Work under the Contract in whole, or in part, upon determination by the Owner that such termination is in the Owner's best interest. Such termination is referred to herein as Termination for Convenience.

(2) Upon receipt of a written notice of Termination for Convenience from the Owner, the Contractor shall:

(a) stop Work as specified in the notice;

(b) enter into no further subcontracts or purchase orders for materials, services, or facilities, except as may be necessary for Work directed to be performed prior to the effective date of the termination or to complete Work that is not terminated;

(c) terminate all existing subcontracts and purchase orders to the extent they relate to the terminated Work;

(d) take such actions as are necessary, or directed by the Architect or Owner, to protect, preserve, and make safe the terminated Work; and

(e) complete performance of the Work that is not terminated.

(3) In the event of Termination for Convenience, the Contractor shall be entitled to receive payment for the Work performed prior to its termination, including materials and equipment purchased and delivered for incorporation into the terminated Work, and any reasonable costs incurred because of the termination. Such payment shall include reasonable mark-up of costs for overhead and profit, not to exceed the limits stated in Article 19, Changes in the Work. The Contractor shall be entitled to receive payment for reasonable anticipated overhead ("home office") and shall not be entitled to receive payment for any profits anticipated to have been gained from the terminated Work. A proposal for decreasing the Contract Sum shall be submitted to the Architect by the Contractor in such time and detail, and with such supporting documentation, as is reasonably directed by the Owner. Final modification of the Contract shall be by Contract Change Order pursuant to Article 19. Any Claim or Dispute involving the termination or any amount due a party as a result shall be resolved pursuant to Article 24.

ARTICLE 28
CONTRACTOR'S RIGHT to SUSPEND or TERMINATE the CONTRACT

A. SUSPENSION by the OWNER

If all of the Work is suspended or delayed for the Owner's convenience or under an order of any court, or other public authority, for a period of sixty days, through no act or fault of the Contractor or a Subcontractor, or anyone for whose acts they may be liable, then the Contractor may give the Owner a written Notice of Termination which allows the Owner fourteen days after receiving the Notice in which to give the Contractor appropriate written authorization to resume the Work. Absent the Contractor's receipt of such authorization to resume the Work, the Contract shall terminate upon expiration of this fourteen day period and the Contractor will be compensated by the Owner as if the termination had been for the Owner's convenience pursuant to Article 27.B.

B. NONPAYMENT

The Owner's failure to pay the undisputed amount of an Application for Payment within sixty days after receiving it from the Architect (Certified pursuant to Article 30) shall be just cause for the Contractor to give the Owner fourteen days' written notice that the Work will be suspended pending receipt of payment but that the Contract shall terminate if payment is not received within fourteen days (or a longer period stated by the Contractor) of the expiration of the fourteen day notice period.

(1) If the Work is then suspended for nonpayment, but resumed upon receipt of payment, the Contractor will be entitled to compensation as if the suspension had been by the Owner pursuant to Article 26, Paragraph B.

(2) If the Contract is then terminated for nonpayment, the Contractor will be entitled to compensation as if the termination had been by the Owner pursuant to Article 27, Paragraph B.

ARTICLE 29
PROGRESS PAYMENTS

A. FREQUENCY of PROGRESS PAYMENTS

Unless otherwise provided in the Contract Documents, the Owner will make payments to the Contractor as the Work progresses based on monthly estimates prepared and certified by the Contractor, approved and certified by the Architect, and approved by the Owner and other authorities whose approval is required.

B. SCHEDULE of VALUES

Within ten days after receiving the Notice to Proceed the Contractor shall submit to the Architect a DCM Form C-10SOV, Schedule of Values, which is a breakdown of the Contract Sum showing the value of the various parts of the Work for billing purposes. The Schedule of Values shall be printable on 8.5" × 11" and shall divide the Contract Sum into as many parts ("line items") as the Architect and Owner determine necessary to permit evaluation and to show amounts attributable to

Subcontractors. The Contractor's overhead and profit are to be proportionately distributed throughout the line items of the Schedule of Values. Upon approval, the Schedule of Values shall be used as a basis for monthly Applications for Payment, unless it is later found to be in error. Approved change order amounts shall be added to or incorporated into the Schedule of Values as mutually agreed by the Contractor and Architect.

C. APPLICATIONS for PAYMENTS

(1) Based on the approved Schedule of Values, each DCM Form C-10, Application and Certificate for Payment shall show the Contractor's estimate of the value of Work performed in each line item as of the end of the billing period. The Contractor's cost of materials and equipment not yet incorporated into the Work, but delivered and suitably stored on the site, may be considered in monthly Applications for Payment. One payment application per month may be submitted. Each DCM Form C-10, Application and Certificate for Payment shall match to the penny and be accompanied by an attached DCM Form C-10SOV, Schedule of Values.

(2) The Contractor's estimate of the value of Work performed and stored materials must represent such reasonableness as to warrant certification by the Architect to the Owner in accordance with Article 30. Each monthly Application for Payment shall be supported by such data as will substantiate the Contractor's right to payment, including without limitation copies of requisitions from subcontractors and material suppliers.

(3) If no other date is stated in the Contract Documents or agreed upon by the parties, each Application for Payment shall be submitted to the Architect on or about the first day of each month and payment shall be issued to the Contractor within thirty days after an Application for Payment is Certified pursuant to Article 30 and delivered to the Owner.

(4) The Applications for Payment of State Agency/Authority projects and Public School and College Authority (PSCA)-funded projects must be activated via the appropriate DocuSign link available from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud.

D. MATERIALS STORED OFF SITE

Unless otherwise provided in the Contract Documents, the Contractor's cost of materials and equipment to be incorporated into the Work, which are stored off the site, may also be considered in monthly Applications for Payment under the following conditions:

(1) the contractor has received written approval from the Architect and Owner to store the materials or equipment off site in advance of delivering the materials to the off site location;

(2) a Certificate of Insurance is furnished to the Architect evidencing that a special insurance policy, or rider to an existing policy, has been obtained by the Contractor providing all-risk property insurance coverage, specifically naming the materials or equipment stored, and naming the Owner as an additionally insured party;

(3) the Architect is provided with a detailed inventory of the stored materials or equipment and the materials or equipment are clearly marked in correlation to the inventory to facilitate inspection and verification of the presence of the materials or equipment by the Architect or Owner;

(4) the materials or equipment are properly and safely stored in a bonded warehouse, or a facility otherwise approved in advance by the Architect and Owner; and

(5) compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest.

E. RETAINAGE

(1) "Retainage" is defined as the money earned and, therefore, belonging to the Contractor (subject to final settlement of the Contract) which has been retained by the Owner conditioned on final completion and acceptance of all Work required by the Contract Documents. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected Work.

(2) In making progress payments the Owner shall retain five percent of the estimated value of Work performed and the value of the materials stored for the Work; but after retainage has been held upon fifty percent of the Contract Sum, no additional retainage will be withheld.

F. CONTRACTOR'S CERTIFICATION

(1) Each Application for Payment shall bear the Contractor's certification that, to the best of the Contractor's knowledge, information, and belief, the Work covered by the Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payments were issued and payments received from the Owner and that the current payment shown in the Application for Payment has not yet been received.

(2) By making this certification the Contractor represents to the Architect and Owner that, upon receipt of previous progress payments from the Owner, the Contractor has promptly paid each Subcontractor, in accordance with the terms of its agreement with the Subcontractor, the amount due the Subcontractor from the amount included in the progress payment on account of the Subcontractor's Work and stored materials. The Architect and Owner may advise Subcontractors and suppliers regarding percentages of completion or amounts requested and/or approved in an Application for Payment on account of the Subcontractor's Work and stored materials.

G. PAYMENT ESTABLISHES OWNERSHIP

All material and Work covered by progress payments shall become the sole property of the Owner, but the Contractor shall not be relieved from the sole responsibility for the care and protection of material and Work upon which payments have been made and for the restoration of any damaged material and Work.

ARTICLE 30
CERTIFICATION and APPROVALS for PAYMENT

A. The Architect's review, approval, and certification of Applications for Payment shall be based on the Architect's general knowledge of the Work obtained through site visits and the information provided by the Contractor with the Application. The Architect shall not be required to perform exhaustive examinations, evaluations, or estimates of the cost of completed or uncompleted Work or stored materials to verify the accuracy of amounts requested by the Contractor, but the Architect shall have the authority to adjust the Contractor's estimate when, in the Architect's reasonable opinion, such estimates are overstated or understated.

B. Within seven days after receiving the Contractor's monthly Application for Payment, or such other time as may be stated in the Contract Documents, the Architect will take one of the following actions:

(1) The Architect will approve and certify the Application as submitted and forward it to the Owner as a Certification for Payment for approval by the Owner (and other approving authorities, if any) and payment.

(2) If the Architect takes exception to any amounts claimed by the Contractor and the Contractor and Architect cannot agree on revised amounts, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to certify to the Owner, transmitting a copy of same to the Contractor.

(3) To the extent the Architect determines may be necessary to protect the Owner from loss on account of any of the causes stated in Article 31, the Architect may subtract from the Contractor's estimates and will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due and notify the Contractor and Owner in writing of the Architect's reasons for withholding payment in whole or in part.

C. Neither the Architect's issuance of a Certificate for Payment nor the Owner's resulting progress payment shall be a representation to the Contractor that the Work in progress or completed at that time is accepted or deemed to be in conformance with the Contract Documents.

D. The Architect shall not be required to determine that the Contractor has promptly or fully paid Subcontractors and suppliers or how or for what purpose the Contractor has used monies paid under the Construction Contract. However, the Architect may, upon request and if practical, inform any Subcontractor or supplier of the amount, or percentage of completion, approved or paid to the Contractor on account of the materials supplied or the Work performed by the Subcontractor.

ARTICLE 31
PAYMENTS WITHHELD

A. The Architect may nullify or revise a previously issued Certificate for Payment prior to Owner's payment thereunder to the extent as may be necessary in the Architect's opinion to protect the Owner from loss on account of any of the following causes not discovered or fully accounted for at the time of the certification or approval of the Application for Payment:

(1) Defective Work;
(2) filed, or reasonable evidence indicating probable filing of, claims arising out of the Contract by other parties against the Contractor;
(3) the Contractor's failure to pay for labor, materials or equipment or to pay Subcontractors;
(4) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
(5) damage suffered by the Owner or another contractor caused by the Contractor, a Subcontractor, or anyone for whose acts they may be liable;
(6) reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance is insufficient to cover applicable liquidated damages; or
(7) the Contractor's persistent failure to conform to the requirements of the Contract Documents.

B. If the Owner deems it necessary to withhold payment pursuant to preceding Paragraph A, the Owner will notify the Contractor and Architect in writing of the amount to be withheld and the reason for same.

C. The Architect shall not be required to withhold payment for completed or partially completed Work for which compliance with the Contract Documents remains to be determined by Specified Inspections or Final Inspections to be performed in their proper sequence. However, if Work for which payment has been approved, certified, or made under an Application for Payment is subsequently determined to be Defective Work, the Architect shall determine an appropriate amount that will protect the Owner's interest against the Defective Work.

(1) If payment has not been made against the Application for Payment first including the Defective Work, the Architect will notify the Owner and Contractor of the amount to be withheld from the payment until the Defective Work is brought into compliance with the Contract Documents.

(2) If payment has been made against the Application for Payment first including the Defective Work, the Architect will withhold the appropriate amount from the next Application for Payment submitted after the determination of noncompliance, such amount to then be withheld until the Defective Work is brought into compliance with the Contract Documents.

D. The amount withheld will be paid with the next Application for Payment certified and approved after the condition for which the Owner has withheld payment is removed or otherwise resolved to the Owner's satisfaction.

E. The Owner shall have the right to withhold from payments due the Contractor under this Contract an amount equal to any amount which the Contractor owes the Owner under another contract.

ARTICLE 32
SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work ("punch list" items). Substantial Completion of the Work, or a designated portion of the Work, is not achieved until so agreed in a Certificate of Substantial Completion signed by the Contractor, Architect, Owner, and Technical Staff of the Alabama Division of Construction Management.

B. The Contractor shall notify the Architect in writing when it considers the Work, or a portion of the Work which the Owner has agreed to accept separately, to be substantially complete and ready for a Final Inspection pursuant to Article 16. In this notification the Contractor shall identify any items remaining to be completed or corrected for Final Acceptance prior to final payment.

C. Substantial Completion is achieved and a Final Inspection is appropriate only when a minimal number of punch list items exists and only a short period of time will be required to correct or complete them. Upon receipt of the Contractor's notice for a Final Inspection, the Architect will advise the Contractor in writing of any conditions of the Work which the Architect or Owner is

aware do not constitute Substantial Completion, otherwise, a Final Inspection will proceed within a reasonable time after the Contractor's notice is given. However, the Architect will not be required to prepare lengthy listings of punch list items; therefore, if the Final Inspection discloses that Substantial Completion has not been achieved, the Architect may discontinue or suspend the inspection until the Contractor does achieve Substantial Completion.

D. CERTIFICATE of SUBSTANTIAL COMPLETION

(1) When the Work or a designated portion of the Work is substantially complete, the Architect will prepare (via the appropriate DocuSign link available from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud) and sign a Certificate of Substantial Completion to be signed in order by the Contractor, Owner, and Alabama Division of Construction Management.

(2) When signed by all parties, the Certificate of Substantial Completion shall establish the Date of Substantial Completion which is the date upon which:

(a) the Work, or designated portion of the Work, is accepted by the Architect, Owner, and Alabama Division of Construction Management as being ready for occupancy,

(b) the Contractor's one-year and special warranties for the Work covered by the Certificate commence, unless stated otherwise in the Certificate (the one-year warranty for punch list items completed or corrected after the period allowed in the Certificate shall commence on the date of their Final Acceptance), and

(c) Owner becomes responsible for building security, maintenance, utility services, and insurance, unless stated otherwise in the Certificate.

(3) The Certificate of Substantial Completion shall set the time within which the Contractor shall finish all items on the "punch list" accompanying the Certificate. The completion of punch list items shall be a condition precedent to Final Payment.

(4) If the Work or designated portion covered by a Certificate of Substantial Completion includes roofing work, the General Contractor's (5-year) Roofing Guarantee, DCM Form C-9, must be executed by the Contractor and attached to the Certificate of Substantial Completion. If the Contract Documents specify any other roofing warranties to be provided by the roofing manufacturer, Subcontractor, or Contractor, they must also be attached to the Certificate of Substantial Completion. The Alabama Division of Construction Management will not sign the Certificate of Substantial Completion in the absence of the roofing guarantees.

E. The Date of Substantial Completion of the Work, as set in the Certificate of Substantial Completion of the Work or of the last completed portion of the Work, establishes the extent to which the Contractor is liable for Liquidated Damages, if any; however, should the Contractor fail to complete all punch list items within thirty days, or such other time as may be stated in the respective Certificate of Substantial Completion, the Contractor shall bear any expenses, including additional Architectural services and expenses, incurred by the Owner as a result of such failure to complete punch list items in a timely manner.

ARTICLE 33
OCCUPANCY or USE PRIOR to COMPLETION

A. UPON SUBSTANTIAL COMPLETION

Prior to completion of the entire Work, the Owner may occupy or begin utilizing any designated portion of the Work on the agreed Date of Substantial Completion of that portion of the Work.

B. BEFORE SUBSTANTIAL COMPLETION

(1) The Owner shall not occupy or utilize any portion of the Work before Substantial Completion of that portion has been achieved.

(2) The Owner may deliver furniture and equipment and store, or install it in place ready for occupancy and use, in any designated portion of the Work before it is substantially completed under the following conditions:

(a) The Owner's storage or installation of furniture and equipment will not unreasonably disrupt or interfere with the Contractor's completion of the designated portion of the Work.

(b) The Contractor consents to the Owner's planned action (such consent shall not be unreasonably withheld).

(c) The Owner shall be responsible for insurance coverage of the Owner's furniture and equipment, and the Contractor's liability shall not be increased.

(d) The Contractor, Architect, and Owner will jointly inspect and record the condition of the Work in the area before the Owner delivers and stores or installs furniture and equipment; the Owner will equitably compensate the Contractor for making any repairs to the Work that may subsequently be required due to the Owner's delivery and storage or installation of furniture and equipment.

(e) The Owner's delivery and storage or installation of furniture and equipment shall not be deemed an acceptance of any Work not completed in accordance with the requirements of the Contract Documents.

ARTICLE 34
FINAL PAYMENT

A. PREREQUISITES to FINAL PAYMENT

The following conditions are prerequisites to Final Payment becoming due the Contractor:

(1) Full execution of a Certificate of Substantial Completion for the Work, or each designated portion of the Work.

(2) Final Acceptance of the Work.

(3) The Contractor's completion, to the satisfaction of the Architect and Owner, of all documentary requirements of the Contract Documents; such as delivery of "as-built" documents, operating and maintenance manuals, warranties, etc.

(4) Delivery to the Owner of a final Application for Payment, prepared by the Contractor and approved and certified by the Architect. Architect prepares DCM Form B-13: Final Payment Checklist and forwards it to the Owner along with the final Application for Payment.

(5) Completion of an Advertisement for Completion pursuant to Paragraph C below.

(6) Delivery by the Contractor to the Owner through the Architect of DCM Form C-18: Contractor's Affidavit of Payment of Debts and Claims, and a Release of Claims, if any, and such other documents as may be required by Owner, satisfactory in form to the Owner pursuant to Paragraph D below.

(7) Consent of Surety to Final Payment, if any, to Contractor. This Consent of Surety is required for projects which have Payment and Performance Bonds.

(8) Delivery by the Contractor to the Architect and Owner of other documents, if any, required by the Contract Documents as prerequisites to Final Payment.

(9) See Manual of Procedures Chapter 7, Section L.7 concerning reconciliation of contract time, if any.

B. FINAL ACCEPTANCE of the WORK

"Final Acceptance of the Work" shall be achieved when all "punch list" items recorded with the Certificate(s) of Substantial Completion are accounted for by either: **(1)** their completion or correction by the Contractor and acceptance by the Architect, Owner, and DCM Project Inspector, or **(2)** their resolution under Article 18, Deductions for Uncorrected Work.

C. ADVERTISEMENT for COMPLETION

(1) If the Contract Sum is less than $100,000: Advertisement for Completion shall not apply to contractors performing contracts of less than $100,000.00 in amount. §39-1-1(g)

(2) If the Contract Sum is $100,000 or more: The Contractor, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion, similar to the sample contained in the Project Manual, published for a period of three weeks. The contractor can publish a notice in one or more of the following ways:

(a) In a newspaper of general circulation in the county or counties in which the work, or some portion thereof, has been done.

(b) On a website that is maintained by a newspaper of general circulation in the county or counties in which the work, or some portion thereof, has been done. (c) On a website utilized by the awarding authority for publishing notices.

(d) If no newspaper is published in the county in which the work was done, and if the awarding authority does not utilize a website for the purpose of publishing notices, the notice may be given by posting at the courthouse for 30 days, and proof of the posting of the notice shall be given by the awarding authority and the contractor.

Proof of publication of the notice shall be made by the contractor to the authority by whom the contract was made by affidavit of the publisher or website owner and a printed copy of the notice published. A final settlement shall not be made upon the contract until the expiration of 30 days after the completion of the notice.

D. RELEASE of CLAIMS

The Release of Claims and other documents referenced in Paragraph A(6) above are as follows:

(1) A release executed by Contractor of all claims and claims of lien against the Owner arising under and by virtue of the Contract, other than such claims of the Contractor, if any, as may have been previously made in writing and as may be specifically excepted by the Contractor from the operation of the release in stated amounts to be set forth therein.

(2) An affidavit under oath, if required, stating that so far as the Contractor has knowledge or information, there are no claims or claims of lien which have been or will be filed by any Subcontractor, Supplier or other party for labor or material for which a claim or claim of lien could be filed.

(3) A release, if required, of all claims and claims of lien made by any Subcontractor, Supplier or other party against the Owner or unpaid Contract funds held by the Owner arising under or related to the Work on the Project; provided, however, that if any Subcontractor, Supplier or others refuse to furnish a release of such claims or claims of lien, the Contractor may furnish a bond executed by Contractor and its Surety to the Owner to provide an unconditional obligation to defend, indemnify and hold harmless the Owner against any loss, cost or expense, including attorney's fees, arising out of or as a result of such claims, or claims of lien, in which event Owner may make Final Payment notwithstanding such claims or claims of lien. If Contractor and Surety fail to fulfill their obligations to Owner under the bond, the Owner shall be entitled to recover damages as a result of such failure, including all costs and reasonable attorney's fees incurred to recover such damages.

E. EFFECT of FINAL PAYMENT

(1) The making of Final Payment shall constitute a waiver of Claims by the Owner except those arising from:

- **(a)** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **(b)** failure of the Work to comply with the requirements of the Contract Documents;
- **(c)** terms of warranties or indemnities required by the Contract Documents, or
- **(d)** latent defects.

(2) Acceptance of Final Payment by the Contractor shall constitute a waiver of claims by Contractor except those previously made in writing, identified by Contractor as unsettled at the time of final Application for Payment, and specifically excepted from the release provided for in Paragraph D(1), above.

ARTICLE 35
CONTRACTOR'S WARRANTY

A. GENERAL WARRANTY

The Contractor warrants to the Owner and Architect that all materials and equipment furnished under the Contract will be of good quality and new, except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise, and that none of the Work will be Defective Work as defined in Article 1.

B. ONE-YEAR WARRANTY

(1) If, within one year after the date of Substantial Completion of the Work or each designated portion of the Work (or otherwise as agreed upon in a mutually-executed Certificate of Substantial Completion), any of the Work is found to be Defective Work, the Contractor shall promptly upon receipt of written notice from the Owner or Architect, and without expense to either, replace or correct the Defective Work to conform to the requirements of the Contract Documents, and repair all damage to the site, the building and its contents which is the result of Defective Work or its replacement or correction.

(2) The one-year warranty for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The one-year warranty for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion,

and other Work performed after Substantial Completion, shall begin on the date of Final Acceptance of the Work. The Contractor's correction of Work pursuant to this warranty does not extend the period of the warranty. The Contractor's one-year warranty does not apply to defects or damages due to improper or insufficient maintenance, improper operation, or wear and tear during normal usage.

(3) Upon recognizing a condition of Defective Work, the Owner shall promptly notify the Contractor of the condition. If the condition is causing damage to the building, its contents, equipment, or site, the Owner shall take reasonable actions to mitigate the damage or its continuation, if practical. If the Contractor fails to proceed promptly to comply with the terms of the warranty, or to provide the Owner with satisfactory written verification that positive action is in process, the Owner may have the Defective Work replaced or corrected and the Contractor and the Contractor's Surety shall be liable for all expense incurred.

(4) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one-year warranty period(s). The inspection must be scheduled with the Owner, Architect and DCM Inspector. The subsequent delivery of the Architect's report of a Year-end Inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period.

(5) The Contractor's warranty of one year is in addition to, and not a limitation of, any other remedy stated herein or available to the Owner under applicable law.

C. GENERAL CONTRACTOR'S ROOFING GUARANTEE

(1) In addition to any other roof related warranties or guarantees that may be specified in the Contract Documents, the roof and associated work shall be guaranteed by the General Contractor against leaks and defects of materials and workmanship for a period of five (5) years, starting on the Date of Substantial Completion of the Project as stated in the Certificate of Substantial Completion. This guarantee for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The guarantee for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion shall begin on the date of Final Acceptance of the Work.

(2) The "General Contractor's Roofing Guarantee" (DCM Form C-9), included in the Project Manual, shall be executed in triplicate, signed by the appropriate party and submitted to the Architect for submission with the Certificate of Substantial Completion to the Owner and the Division of Construction Management.

(3) This guarantee does not include costs which might be incurred by the General Contractor in making visits to the site requested by the Owner regarding roof problems that are due to lack of proper maintenance (keeping roof drains and/or gutters clear of debris that cause a stoppage of drainage which results in water ponding, overflowing of flashing, etc.), or damages caused by vandalism or misuse of roof areas. Should the contractor be required to return to the job to correct problems of this nature that are determined not to be related to faulty workmanship and materials in the installation of the roof, payment for actions taken by the Contractor in response to such request will be the responsibility of the Owner. A detailed written report shall be made by the General Contractor on each of these 'Service Calls' with copies to the Architect, Owner and Division of Construction Management.

D. SPECIAL WARRANTIES

(1) The Contractor shall deliver to the Owner through the Architect all special or extended warranties required by the Contract Documents from the Contractor, Subcontractors, and suppliers.

(2) The Contractor and the Contractor's Surety shall be liable to the Owner for such special warranties during the Contractor's one-year warranty; thereafter, the Contractor's obligations relative to such special warranties shall be to provide reasonable assistance to the Owner in their enforcement.

E. ASSUMPTION of GUARANTEES of OTHERS

If the Contractor disturbs, alters, or damages any work guaranteed under a separate contract, thereby voiding the guarantee of that work, the Contractor shall restore the work to a condition satisfactory to the Owner and shall also guarantee it to the same extent that it was guaranteed under the separate contract.

ARTICLE 36
INDEMNIFICATION AGREEMENT

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, Architect, Architect's consultants, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, employees, and consultants (hereinafter collectively referred to as the "Indemnitees") from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of, related to, or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, and is caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether such claim, damage, loss or expense is caused in part, or is alleged but not legally established to have been caused in whole or in part by the negligence or other fault of a party indemnified hereunder.

A. This indemnification shall extend to all claims, damages, losses and expenses for injury or damage to adjacent or neighboring property, or persons injured thereon, that arise out of, relate to, or result from performance of the Work.

B. This indemnification does not extend to the liability of the Architect, or the Architect's Consultants, agents, or employees, arising out of **(1)** the preparation or approval of maps, shop drawings, opinions, reports, surveys, field orders, Change Orders, drawings or specifications, or **(2)** the giving of or the failure to give directions or instructions, provided such giving or failure to give instructions is the primary cause of the injury or damage.

C. This indemnification does not apply to the extent of the sole negligence of the Indemnitees.

ARTICLE 37
CONTRACTOR'S and SUBCONTRACTORS' INSURANCE

(Provide entire Article 37 to Contractor's insurance representative.)

A. GENERAL

(1) RESPONSIBILITY. The Contractor shall be responsible to the Owner from the time of the signing of the Construction Contract or from the beginning of the first work, whichever shall be earlier, for all injury or damage of any kind resulting from any negligent act or omission or breach, failure or other default regarding the work by the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of who may be the owner of the property.

(2) INSURANCE PROVIDERS. Each of the insurance coverages required below shall be issued by an insurer licensed by the Insurance Commissioner to transact the business of insurance in the State of Alabama for the applicable line of insurance, and such insurer (or, for qualified self-insureds or group self-insureds, a specific excess insurer providing statutory limits) must have a Best Policyholders Rating of "A-" or better and a financial size rating of Class V or larger.

(3) NOTIFICATION ENDORSEMENT. Each policy shall be endorsed to provide that the insurance company agrees that the policy shall not be canceled, changed, allowed to lapse or allowed to expire for any reason until thirty days after the Owner has received written notice by certified mail as evidenced by return receipt or until such time as other insurance coverage providing protection equal to protection called for in the Contract Documents shall have been received, accepted and acknowledged by the Owner. Such notice shall be valid only as to the Project as shall have been designated by Project Name and Number in said notice.

(4) INSURANCE CERTIFICATES. The Contractor shall procure the insurance coverages identified below, or as otherwise required in the Contract Documents, at the Contractor's own expense, and to evidence that such insurance coverages are in effect, the Contractor shall furnish the Owner an insurance certificate(s) acceptable to the Owner and listing the Owner as the certificate holder. The insurance certificate(s) must be delivered to the Owner with the Construction Contract and Bonds for final approval and execution of the Construction Contract. The insurance certificate must provide the following:

- **(a)** Name and address of authorized agent of the insurance company
- **(b)** Name and address of insured
- **(c)** Name of insurance company or companies
- **(d)** Description of policies
- **(e)** Policy Number(s)
- **(f)** Policy Period(s)
- **(g)** Limits of liability
- **(h)** Name and address of Owner as certificate holder
- **(i)** Project Name and Number, if any
- **(j)** Signature of authorized agent of the insurance company
- **(k)** Telephone number of authorized agent of the insurance company
- **(l)** Mandatory thirty day notice of cancellation / non-renewal / change

(5) MAXIMUM DEDUCTIBLE. Self-insured retention, except for qualified self-insurers or group self-insurers, in any policy shall not exceed $25,000.00.

B. INSURANCE COVERAGES

Unless otherwise provided in the Contract Documents, the Contractor shall purchase the types of insurance coverages with liability limits not less than as follows:

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE

(a) Workers' Compensation coverage shall be provided in accordance with the statutory coverage required in Alabama. A group insurer must submit a certificate of authority from the Alabama Department of Industrial Relations approving the group insurance plan. A self-insurer must submit a certificate from the Alabama Department of Industrial Relations stating the Contractor qualifies to pay its own workers' compensation claims.

(b) Employer's Liability Insurance limits shall be at least:

.1 Bodily Injury by Accident - $1,000,000 each accident

.2 Bodily Injury by Disease - $1,000,000 each employee

(2) COMMERCIAL GENERAL LIABILITY INSURANCE

(a) Commercial General Liability Insurance, written on an ISO Occurrence Form (current edition as of the date of Advertisement for Bids) or equivalent, shall include, but need not be limited to, coverage for bodily injury and property damage arising from premises and operations liability, products and completed operations liability, blasting and explosion, collapse of structures, underground damage, personal injury liability and contractual liability. The Commercial General Liability Insurance shall provide at minimum the following limits:

Coverage	Limit
.1 General Aggregate	$ 2,000,000.00 per Project
.2 Products, Completed Operations Aggregate	$ 2,000,000.00 per Project
.3 Personal and Advertising Injury	$ 1,000,000.00 per Occurrence
.4 Each Occurrence	$ 1,000,000.00

(b) Additional Requirements for Commercial General Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants and employees as additional insureds, state that this coverage shall be primary insurance for the additional insureds; and contain no exclusions of the additional insureds relative to job accidents.

.2 The policy must include separate per project aggregate limits.

(3) COMMERCIAL BUSINESS AUTOMOBILE LIABILITY INSURANCE

(a) Commercial Business Automobile Liability Insurance which shall include coverage for bodily injury and property damage arising from the operation of any owned, non-owned or hired automobile. The Commercial Business Automobile Liability Insurance Policy shall provide not less than $1,000,000 Combined Single Limits for each occurrence.

(b) The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

(4) COMMERCIAL UMBRELLA OR COMMERCIAL EXCESS LIABILITY INSURANCE

(a) Commercial Umbrella or Commercial Excess Liability Insurance to provide excess coverage above the Commercial General Liability, Commercial Business Automobile

Liability and the Workers' Compensation and Employer's Liability to satisfy the minimum limits set forth herein.

(b) Minimum Combined Primary Commercial General Liability and Commercial Umbrella or Commercial Excess Limits of:

.1 $ 5,000,000 per Occurrence

.2 $ 5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella or Commercial Excess Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

.2 The policy must be on an "occurrence" basis.

(5) BUILDER'S RISK INSURANCE

(a) The Builder's Risk Policy shall be made payable to the Owner and Contractor, as their interests may appear. The policy amount shall be equal to 100% of the Contract Sum, written on a Causes of Loss - Special Form (current edition as of the date of Advertisement for Bids), or its equivalent. All deductibles shall be the sole responsibility of the Contractor.

(b) The policy shall be endorsed as follows:

"The following may occur without diminishing, changing, altering or otherwise affecting the coverage and protection afforded the insured under this policy:

(i) Furniture and equipment may be delivered to the insured premises and installed in place ready for use; or

(ii) Partial or complete occupancy by Owner; or

(iii) Performance of work in connection with construction operations insured by the Owner, by agents or lessees or other contractors of the Owner, or by contractors of the lessee of the Owner."

Exception: projects containing only abatement and/or only demolition do not require Builder's Risk insurance, unless required by the Owner. Note: projects containing any scope of work besides abatement and/or demolition require Builder's Risk insurance.

C. SUBCONTRACTORS' INSURANCE

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain Workers' Compensation and Employer's Liability Insurance coverages as described in preceding Paragraph B, or to be covered by the Contractor's Workers' Compensation and Employer's Liability Insurance while performing Work under the Contract.

(2) LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain adequate General Liability, Automobile Liability, and Umbrella or Excess Liability Insurance coverages similar to those described in preceding Paragraph B. Such coverage shall be in effect at all times that a Subcontractor is performing Work under the Contract.

(3) ENFORCEMENT RESPONSIBILITY. The Contractor shall have responsibility to enforce its Subcontractors' compliance with these or similar insurance requirements; however, the Contractor shall, upon request, provide the Architect or Owner acceptable evidence of insurance for any Subcontractor.

D. TERMINATION of OBLIGATION to INSURE

Unless otherwise expressly provided in the Contract Documents, the obligation to insure as provided herein shall continue as follows:

(1) BUILDER'S RISK INSURANCE. The obligation to insure under Subparagraph B(5) shall remain in effect until the Date of Substantial Completion as shall be established in the Certificate of Substantial Completion. In the event that multiple Certificates of Substantial Completion covering designated portions of the Work are issued, Builder's Risk coverage shall remain in effect until the Date of Substantial Completion as shall be established in the last issued Certificate of Substantial Completion. However, in the case that the Work involves separate buildings, Builder's Risk coverage of each separate building may terminate on the Date of Substantial Completion as established in the Certificate of Substantial Completion issued for each building.

(2) PRODUCTS and COMPLETED OPERATIONS. The obligation to carry Products and Completed Operations coverage specified under Subparagraph B(2) shall remain in effect for two years after the Date(s) of Substantial Completion.

(3) ALL OTHER INSURANCE. The obligation to carry other insurance coverages specified under Subparagraphs B(1) through B(4) and Paragraph C shall remain in effect after the Date(s) of Substantial Completion until such time as all Work required by the Contract Documents is completed. Equal or similar insurance coverages shall remain in effect if, after completion of the Work, the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, returns to the Project to perform warranty or maintenance work pursuant to the terms of the Contract Documents.

E. WAIVERS of SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk insurance applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall not be applicable to loss or damage that occurs after final acceptance of the Work. Any provision found herein which attempts to waive or invalidate the subrogation interests of Alabama's State Insurance Fund against any party to this contract or any other person or entity is void and invalid. No such waiver is intended or made by the parties to this agreement with regard to any property insured by the State Insurance Fund.

ARTICLE 38
PERFORMANCE and PAYMENT BONDS

A. GENERAL

Upon signing and returning the Construction Contract to the Owner for final approval and execution, the Contractor shall, at the Contractor's expense, furnish to the Owner a Performance Bond and a Payment Bond (P&P Bonds), DCM Forms C-6 and C-7 as contained in the Project Manual, each in a penal sum equal to 100% of the Contract Sum. Each bond shall be on the form contained in the Project Manual, shall be executed by a surety company (Surety) acceptable to the Owner and duly authorized and qualified to make such bonds in the State of Alabama in the required amount. The P&P bonds must be signed either on the same day or after the construction contract date. Each P&P Bond shall have attached thereto a power of attorney (POA) of the signing official. The POA signature date must be the same day as the P&P Bond's signature date. All signatures must be present.

The provisions of this Article are not applicable to this Contract if the Contract Sum is less than $100,000, unless bonds are required for this Contract in the Supplemental General Conditions.

B. PERFORMANCE BOND

Through the Performance Bond, the Surety's obligation to the Owner shall be to assure the prompt and faithful performance of the Contract and Contract Change Orders. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. In case of default on the part of the Contractor, the Surety shall take charge of and complete the Work in accordance with the terms of the Performance Bond. Any reasonable expenses incurred by the Owner as a result of default on the part of the Contractor, including architectural, engineering, administrative, and legal services, shall be recoverable under the Performance Bond.

C. PAYMENT BOND

Through the Payment Bond the Surety's obligation to the Owner shall be to guarantee that the Contractor and its Subcontractors shall promptly make payment to all persons supplying labor, materials, or supplies for, or in, the prosecution of the Work, including the payment of reasonable attorneys fees incurred by successful claimants or plaintiffs in civil actions on the Bond. Any person or entity indicating that they have a claim of nonpayment under the Bond shall, upon written request, be promptly furnished a certified copy of the Bond and Construction Contract by the Contractor, Architect, Owner, or Alabama Division of Construction Management, whomever is recipient of the request.

D. CHANGE ORDERS

The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

E. EXPIRATION

The obligations of the Contractor's performance bond surety shall be coextensive with the

contractor's performance obligations under the Contract Documents; provided, however, that the surety's obligation shall expire at the end of the one-year warranty period(s) of Article 35.

ARTICLE 39
ASSIGNMENT

The Contractor shall not assign the Contract or sublet it as a whole nor assign any moneys due or to become due to the Contractor thereunder without the previous written consent of the Owner (and of the Surety, in the case of a bonded Construction Contract). As prescribed by the Public Works Law, the Contract shall in no event be assigned to an unsuccessful bidder for the Contract whose bid was rejected because the bidder was not a responsible or responsive bidder.

ARTICLE 40
CONSTRUCTION by OWNER or SEPARATE CONTRACTORS

A. OWNER'S RESERVATION of RIGHT

(1) The Owner reserves the right to self-perform, or to award separate contracts for, other portions of the Project and other Project related construction and operations on the site. The contractual conditions of such separate contracts shall be substantially similar to those of this Contract, including insurance requirements and the provisions of this Article. If the Contractor considers such actions to involve delay or additional cost under this Contract, notifications and assertion of claims shall be as provided in Article 20 and Article 23.

(2) When separate contracts are awarded, the term "Contractor" in the separate Contract Documents shall mean the Contractor who executes the respective Construction Contract.

B. COORDINATION

Unless otherwise provided in the Contract Documents, the Owner shall be responsible for coordinating the activities of the Owner's forces and separate contractors with the Work of the Contractor. The Contractor shall cooperate with the Owner and separate contractors, shall participate in reviewing and comparing their construction schedules relative to that of the Contractor when directed to do so, and shall make and adhere to any revisions to the construction schedule resulting from a joint review and mutual agreement.

C. CONDITIONS APPLICABLE to WORK PERFORMED by OWNER

Unless otherwise provided in the Contract Documents, when the Owner self-performs construction or operations related to the Project, the Owner shall be subject to the same obligations to Contractor as Contractor would have to a separate contractor under the provision of this Article 40.

D. MUTUAL RESPONSIBILITY

(1) The Contractor shall reasonably accommodate the required introduction and storage of materials and equipment and performance of activities by the Owner and separate contractors and shall connect and coordinate the Contractor's Work with theirs as required by the Contract Documents.

(2) By proceeding with an element or portion of the Work that is applied to or performed on construction by the Owner or a separate contractor, or which relies upon their operations, the Contractor accepts the condition of such construction or operations as being suitable for the Contractor's Work, except for conditions that are not reasonably discoverable by the Contractor. If the Contractor discovers any condition in such construction or operations that is not suitable for the proper performance of the Work, the Contractor shall not proceed, but shall instead promptly notify the Architect in writing of the condition discovered.

(3) The Contractor shall reimburse the Owner for any costs incurred by a separate contractor and payable by the Owner because of acts or omissions of the Contractor. Likewise, the Owner shall be responsible to the Contractor for any costs incurred by the Contractor because of the acts or omissions of a separate contractor.

(4) The Contractor shall not cut or otherwise alter construction by the Owner or a separate contractor without the written consent of the Owner and separate contractor; such consent shall not be unreasonably withheld. Likewise, the Contractor shall not unreasonably withhold its consent allowing the Owner or a separate contractor to cut or otherwise alter the Work.
(5) The Contractor shall promptly remedy any damage caused by the Contractor to the construction or property of the Owner or separate contractors**.**

ARTICLE 41
SUBCONTRACTS

A. AWARD of SUBCONTRACTS and OTHER CONTRACTS for PORTIONS of the WORK

(1) Unless otherwise provided in the Contract Documents, when delivering the executed Construction Contract, bonds, and evidence of insurance to the Architect, the Contractor shall also submit a listing of Subcontractors proposed for each principal portion of the Work and fabricators or suppliers proposed for furnishing materials or equipment fabricated to the design of the Contract Documents. This listing shall be in addition to any naming of Subcontractors, fabricators, or suppliers that may have been required in the bid process. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner, after due investigation, has reasonable objection to any Subcontractor, fabricator, or supplier proposed by the Contractor. The issuance of the Notice to Proceed in the absence of such objection by the Owner shall constitute notice that no reasonable objection to them is made.

(2) The Contractor shall not contract with a proposed Subcontractor, fabricator, or supplier to whom the Owner has made reasonable and timely objection. Except in accordance with prequalification procedures as may be contained in the Contract Documents, through specified qualifications, or on the grounds of reasonable objection, the Owner may not restrict the Contractor's selection of Subcontractors, fabricators, or suppliers.

(3) Upon the Owner's reasonable objection to a proposed Subcontractor, fabricator, or supplier, the Contractor shall promptly propose another to whom the Owner has no reasonable objection. If the proposed Subcontractor, fabricator, or supplier to whom the Owner made reasonable objection was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be equitably adjusted by Contract Change Order for any resulting difference if the Contractor has acted promptly and responsively in this procedure.

(4) The Contractor shall not change previously selected Subcontractors, fabricators, or suppliers without notifying the Architect and Owner in writing of proposed substitute Subcontractors, fabricators, or suppliers. If the Owner does not make a reasonable objection to a proposed substitute within three working days, the substitute shall be deemed approved.

B. SUBCONTRACTUAL RELATIONS

(1) The Contractor agrees to bind every Subcontractor and material supplier (and require every Subcontractor to so bind its subcontractors and material suppliers) to all the provisions of the Contract Documents as they apply to the Subcontractor's and material supplier's portion of the Work.

(2) Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner, nor to create a duty of the Architect, Owner, or Director to resolve disputes between or among the Contractor or its Subcontractors and suppliers or any other duty to such Subcontractors or suppliers.

ARTICLE 42
ARCHITECT'S STATUS

A. The Architect is an independent contractor performing, with respect to this Contract, pursuant to an agreement executed between the Owner and the Architect. The Architect has prepared the Drawings and Specifications and assembled the Contract Document and is, therefore, charged with their interpretation and clarification as described in the Contract Documents. As a representative of the Owner, the Architect will endeavor to guard the Owner against variances from the requirements of the Contract Documents by the Contractor. On behalf of the Owner, the Architect will administer the Contract as described in the Contract Documents during construction and the Contractor's one-year warranty.

B. So as to maintain continuity in administration of the Contract and performance of the Work, and to facilitate complete documentation of the project record, all communications between the Contractor and Owner regarding matters of or related to the Contract shall be directed through the Architect, unless direct communication is otherwise required to provide a legal notification. Unless otherwise authorized by the Architect, communications by and with the Architect's consultants shall be through the Architect. Unless otherwise authorized by the Contractor, communications by and with Subcontractors and material suppliers shall be through the Contractor.

C. ARCHITECT'S AUTHORITY

Subject to other provisions of the Contract Documents, the following summarizes some of the authority vested in the Architect by the Owner with respect to the Construction Contract and as further described or conditioned in other Articles of these General Conditions of the Contract.

(1) The Architect is authorized to:

- **(a)** approve "minor" deviations as defined in Article 9, Submittals,
- **(b)** make "minor" changes in the Work as defined in Article 19, Changes in the Work,
- **(c)** reject or require the correction of Defective Work,
- **(d)** require the Contractor to stop the performance of Defective Work,
- **(e)** adjust an Application for Payment by the Contractor pursuant to Article 30, Certification

and Approval of payments, and
(f) issue Notices to Cure pursuant to Article 27.

(2) The Architect is not authorized to:
(a) revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations and changes) without concurrence of the Owner,
(b) finally approve or accept any portion of the Work without concurrence of the Owner,
(c) issue instructions contrary to the Contract Documents,
(d) issue Notice of Termination or otherwise terminate the Contract, or
(e) require the Contractor to stop the Work except only to avoid the performance of Defective Work.

D. LIMITATIONS of RESPONSIBILITIES

(1) The Architect shall not be responsible to Contractors or to others for supervising or coordinating the performance of the Work or for the Construction Methods or safety of the Work, unless the Contract Documents give other specific instructions concerning these matters.
(2) The Architect will not be responsible to the Contractor (nor the Owner) for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents or for acts or omissions of the Contractor, a Subcontractor, or anyone for whose acts they may be liable. However, the Architect will report to the Owner and Contractor any Defective Work recognized by the Architect.

(3) The Architect will endeavor to secure faithful performance by Owner and Contractor, and the Architect will not show partiality to either or be liable to either for results of interpretations or decisions rendered in good faith.

(4) The Contractor's remedies for additional time or expense arising out of or related to this Contract, or the breach thereof, shall be solely as provided for in the Contract Documents. The Contractor shall have no claim or cause of action against the Owner, Architect, or its consultants for any actions or failures to act, whether such claim may be in contract, tort, strict liability, or otherwise, it being the agreement of the parties that the Contractor shall make no claim against the Owner or any agents of the Owner, including the Architect or its consultants, except as may be provided for claims or disputes submitted in accordance with Article 24. The Architect and Architect's consultants shall be considered third party beneficiaries of this provision of the Contract and entitled to enforce same.

E. ARCHITECT'S DECISIONS

Decisions by the Architect shall be in writing The Architect's decisions on matters relating to aesthetic effect will be final and binding if consistent with the intent expressed in the Contract Documents. The Architect's decisions regarding disputes arising between the Contractor and Owner shall be advisory.

ARTICLE 43
CASH ALLOWANCES

A. All allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by allowances shall be supplied by the Contractor as directed by the Architect or Owner

and the Contractor shall afford the Owner the economy of obtaining competitive pricing from responsible bidders for allowance items unless other purchasing procedures are specified in the Contract Documents.

B. Unless otherwise provided in the Contract Documents:

(1) allowances shall cover the cost to the Contractor of materials and equipment delivered to the Project site and all applicable taxes, less applicable trade discounts;

(2) the Contractor's costs for unloading, storing, protecting, and handling at the site, labor, installation, overhead, profit and other expenses related to materials or equipment covered by an allowance shall be included in the Contract Sum but not in the allowances;

(3) if required, the Contract Sum shall be adjusted by Change Order to reflect the actual costs of an allowance.

C. Any selections of materials or equipment required of the Architect or Owner under an allowance shall be made in sufficient time to avoid delay of the Work.

ARTICLE 44
PERMITS, LAWS, and REGULATIONS

A. PERMITS, FEES AND NOTICES

(1) Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after award of the Construction Contract and which are in effect on the date of receipt of bids.

(2) The Contractor shall comply with and give notices required by all laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

B. TAXES

Unless stated otherwise in the Contract Documents, materials incorporated into the Work are exempt from sales and use tax pursuant to Section 40-9-33, Code of Alabama, 1975 as amended. The Owner, Contractor and its subcontractors shall be responsible for complying with rules and regulations of the Sales, Use, & Business Tax Division of the Alabama Department of Revenue regarding certificates and other qualifications necessary to claim such exemption when making qualifying purchases from vendors. The Contractor shall pay all applicable taxes that are not covered by the exemption of Section 40-9-33 and which are imposed as of the date of receipt of bids, including those imposed as of the date of receipt of bids but scheduled to go into effect after that date.

C. COMPENSATION for INCREASES

The Contractor shall be compensated for additional costs incurred because of increases in tax rates imposed after the date of receipt of bids.

D. ALABAMA IMMIGRATION LAW

Per ACT 2011-535 as codified in Title 31, Chapter 13 of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

E. ALABAMA TRADE BOYCOTT LAW

Per Act 2016-312as codified in Title 41, Chapter 16, Article 1, of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they are not currently engaged in, and will not engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which this state can enjoy open trade.

EE. ALABAMA ECONOMIC BOYCOTT LAW

Per Act 2023-409 as codified in Title 41, Chapter 16, Article 1 of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they are not currently engaged in, and will not engage in, economic boycotts.

F. ACCOUNTING OF SALES TAX EXEMPT PROJECTS

Per Act 2013-205 as codified in Title 40, Chapter 9, Article 1, of the Code of Alabama, 1975, as amended:

In bidding the work on a tax exempt project, the bid form shall provide an accounting for the tax savings.

ARTICLE 45
ROYALTIES, PATENTS, and COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, employees, and consultants from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of, related to, or resulting from all suits or claims for infringement of any patent rights or copyrights arising out of the inclusion of any patented or copyrighted materials, methods, or systems selected by the Contractor and used during the execution of or incorporated into the Work. This indemnification does not apply to any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods, or systems specified in the Contract Documents. However, if the Contractor has information that a specified material, method, or system is or may constitute an

infringement of a patent or copyright, the Contractor shall be responsible for any resulting loss unless such information is promptly furnished to the Architect.

ARTICLE 46
USE of the SITE

A. The Contractor shall confine its operations at the Project site to areas permitted by the Owner and by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials, equipment, employees' vehicles, or debris. The Contractor's operations at the site shall be restricted to the sole purpose of constructing the Work, use of the site as a staging, assembly, or storage area for other business which the Contractor may undertake shall not be permitted.

B. Unless otherwise provided in the Contract Documents, temporary facilities, such as storage sheds, shops, and offices may be erected on the Project site with the approval of the Architect and Owner. Such temporary buildings and/or utilities shall remain the property of the Contractor, and be removed at the Contractor's expense upon completion of the Work, unless the Owner authorizes their abandonment without removal.

ARTICLE 47
CUTTING and PATCHING

A. The Contractor shall be responsible for all cutting, fitting, or patching that may be required to execute the Work to the results indicated in the Contract Documents or to make its parts fit together properly.

B. Any cutting, patching, or excavation by the Contractor shall be supervised and performed in a manner that will not endanger persons nor damage or endanger the Work or any fully or partially completed construction of the Owner or separate contractors.

ARTICLE 48
IN-PROGRESS and FINAL CLEANUP

A. IN-PROGRESS CLEAN-UP

(1) The Contractor shall at all times during the progress of the Work keep the premises and surrounding area free from rubbish, scrap materials and debris resulting from the Work. Trash and combustible materials shall not be allowed to accumulate inside buildings or elsewhere on the premises. At no time shall any rubbish be thrown from window openings. Burning of trash and debris on site is not permitted.

(2) The Contractor shall make provisions to minimize and confine dust and debris resulting from construction activities.

B. FINAL CLEAN-UP

(1) Before Substantial Completion or Final Acceptance is achieved, the Contractor shall have removed from the Owner's property all construction equipment, tools, and machinery; temporary structures and/or utilities including the foundations thereof (except such as the Owner permits in writing to remain); rubbish, debris, and waste materials; and all surplus materials, leaving the site clean and true to line and grade, and the Work in a safe and clean condition, ready for use and operation.

(2) In addition to the above, and unless otherwise provided in the Contract Documents, the Contractor shall be responsible for the following special cleaning for all trades as the Work is completed:

(a) Cleaning of all painted, enameled, stained, or baked enamel work: Removal of all marks, stains, finger prints and splatters from such surfaces.

(b) Cleaning of all glass: Cleaning and removing of all stickers, labels, stains, and paint from all glass, and the washing and polishing of same on interior and exterior.

(c) Cleaning or polishing of all hardware: Cleaning and polishing of all hardware.

(d) Cleaning all tile, floor finish of all kinds: Removal of all splatters, stains, paint, dirt, and dust, the washing and polishing of all floors as recommended by the manufacturer or required by the Architect.

(e) Cleaning of all manufactured articles, materials, fixtures, appliances, and equipment: Removal of all stickers, rust stains, labels, and temporary covers, and cleaning and conditioning of all manufactured articles, material, fixtures, appliances, and electrical, heating, and air conditioning equipment as recommended or directed by the manufacturers, unless otherwise required by the Architect; blowing out or flushing out of all foreign matter from all equipment, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers, sanitizing potable water systems; and freeing identification plates on all equipment of excess paint and the polishing thereof.

C. OWNER'S RIGHT to CLEAN-UP

If the Contractor fails to comply with these clean-up requirements and then fails to comply with a written directive by the Architect to clean-up the premises within a specified time, the Architect or Owner may implement appropriate clean-up measures and the cost thereof shall be deducted from any amounts due or to become due the Contractor.

ARTICLE 49
LIQUIDATED DAMAGES

A. Time is the essence of the Contract. Any delay in the completion of the Work required by the Contract Documents may cause inconvenience to the public and loss and damage to the Owner including but not limited to interest and additional administrative, architectural, inspection and supervision charges. By executing the Construction Contract, the Contractor agrees that the Contract Time is sufficient for the achievement of Substantial Completion.

B. The Contract Documents may provide in the Construction Contract or elsewhere for a certain dollar amount for which the Contractor and its Surety (if any) will be liable to the Owner as liquidated damages for each calendar day after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work. If such daily liquidated damages are provided for, Owner and Contractor, and its Surety, agree that such amount is reasonable and agree to be bound thereby.

C. If a daily liquidated damage amount is not otherwise provided for in the Contract Documents, a time charge equal to six percent interest per annum on the total Contract Sum may be made against the Contractor for the entire period after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work.

D. The amount of liquidated damages due under either paragraph B or C, above, may be deducted by the Owner from the moneys otherwise due the Contractor in the Final Payment, not as a penalty, but as liquidated damages sustained, or the amount may be recovered from Contractor or its Surety. If part of the Work is substantially completed within the Contract Time and part is not, the stated charge for liquidated damages shall be equitably prorated to that portion of the Work that the Contractor fails to substantially complete within the Contract Time. It is mutually understood and agreed between the parties hereto that such amount is reasonable as liquidated damages.

ARTICLE 50
USE of FOREIGN MATERIALS

A. In the performance of the Work the Contractor agrees to use materials, supplies, and products manufactured, mined, processed or otherwise produced in the United States or its territories, if same are available at reasonable and competitive prices and are not contrary to any sole source specification implemented under the Public Works Law.

B. In the performance of the Work the Contractor agrees to use iron or steel, that are made a permanent part of the structure, produced in the United States if the Contract Documents require the use of iron or steel and do not limit its supply to a sole source pursuant to the Public Works Law. If the Owner decides that the procurement of domestic steel products becomes impractical as a result of national emergency, national strike, or other cause, the Owner shall waive this restriction.

C. If domestic steel or other domestic materials, supplies, and products are not used in accordance with preceding Paragraphs A and B, the Contract Sum shall be reduced by an amount equal to any savings or benefits realized by the Contractor.

D. This Article applies only to Public Works projects financed entirely by the State of Alabama or any political subdivision of the state.

ARTICLE 51
PROJECT SIGN

A. Fully locally-funded State Agency and Public Higher Education projects: DCM Form C-15: Detail of Project Sign must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign. Other conditions besides the contract sum may warrant waiver of this requirement, but only with approval of the Technical Staff.

B. Fully locally-funded K-12 school projects: Project sign is not required unless requested by Owner; if project sign is requested by Owner, include DCM Form C-15: Detail of Project Sign in the project manual.

C. Partially or fully PSCA-funded projects: DCM Form C-15: Detail of Project Sign must be included in the project manual. Contractor shall furnish and erect a project sign for all PSCA-funded projects, regardless of the contract sum. "Alabama Public School and College Authority" as well as the local owner entity must be included as awarding authorities on the project sign of all PSCA-funded projects.

When required per the above conditions, the project sign shall be erected in a prominent location selected by the Architect and Owner and shall be maintained in good condition until completion of Work. If the Contract involves Work on multiple sites, only one project sign is required, which shall be erected on one of the sites in a location selected by the Architect and Owner. Slogan: The title of the current PSCA Act should be placed on the project sign of all PSCA-funded projects, otherwise the Awarding Authority/Owner's slogan, if any, should be used. If the Awarding Authority/Owner of a fully locally-funded project does not have a slogan, the project sign does not require a slogan.

END of
GENERAL CONDITIONS of the CONTRACT

1.0 - GENERAL

1.1 Summary

A. This Section includes administrative and procedural requirements for alternates.

1. Before submitting proposals, Bidders shall read entire specifications, including all divisions, and familiarize themselves with requirements respecting all Alternates, and also how each section of the work is affected by acceptance or omission of Alternates.

2. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

3. Bidders shall state on the Bid Form the amount to amend the Base Bid for making the following changes, including all incidental omissions, additions, and adjustments as may be necessary or required by such changes

B. The Owner will award the Alternates in accordance with and as stated in The DCM Instructions to Bidders, 15. A - D and located at the front of this Project Specification Manual.

C. Before signing the Contracts, the successful Contractor should be familiar with all Alternates and requirements. After signing the contracts, there will be no allowance or extra compensation paid to the Contractor because of omission or ignorance of said requirements.

1.2 Definitions

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 Procedures

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

1.4 Schedule:
A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

ALTERNATE PRICES ARE REQUIRED AS FOLLOWS:

Alternate No. 1: (Additive) Food Service Equipment
The amount to be added to the Base Bid for providing all work (labor and materials) associated with new food service equipment for Concession A 105 as specified and indicated. This price should include coordination with all associated trades as required.
NOTE: All rough-ins shall be included in Base Bid.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 Summary

A. This Section specifies administrative and procedural requirements governing handling and processing allowances.

Selected materials, services and equipment, and in some cases, their installation is shown and specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials, services and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order. **Allowances indicated shall be included in the Base Bid or Alternates as indicated.**

B. Types of allowances required include the following:

1. Lump sum allowances.
2. Contingency allowance.

C. Procedures for submitting and handling Change Orders are included in the General Conditions of the Contract, Article 43.

1.3 Selection and Purchase

At the earliest feasible date after Contract award, advise the Architect of the date when the final selection and purchase of each service, product or system described by an allowance must be completed in order to avoid delay in performance of the Work.

A. When requested by the Architect, obtain proposals for each allowance for use in making final selections; including recommendations that are relevant to performance of the Work.

B. Purchase products and systems as selected by the Architect from the designated supplier.

C. Specific service providers, i.e., geotechnical and landscaping, shall be selected by the Owner.

1.4 Submittals

A. Submit proposals for purchase of products or systems included in allowances. Reduction and addition in allowances shall be in the form specified for Change Orders.

B. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.5 Contingency Allowances

A. Use the contingency allowance only as directed for the Owner's purposes, and only by written approval which designate amounts to be charged to the allowance.

B. **With the exception of quantity allowances, all allowances indicated are contingency allowances and therefore the Owner may transfer balances for other discretionary uses. Overhead and profit margins SHALL NOT BE ADDED to any amount drawn from original Allowance(s) regardless of the indicated use.**

C. Invoicing Procedures:

1. Each contingency allowance shall be a "line item" on the Schedule of Values which is an attachment to the Application and Certificate for Payment as referenced in the "General Conditions of the Contract, Article 29.B".

2. A copy of actual invoices paid by the Contractor and used against the respective Allowance(s), shall be included with the General Contractor's Application for Payment. This will allow all parties to know the remaining balance of Allowance(s) at all times.

3. Overages:
Contractor shall submit to the Architect all costs associated with prior approved overages of Allowance(s). The Architect will prepare change order for these prior approved overages.

4. Unused Balance:
Prior to final Application of Payment, Contractor shall submit total costs associated with Allowance(s). These costs should correspond with Schedule of Values from previous Applications for Payment plus any new charges. The Architect will prepare a change order to credit unused amounts. All changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.

2.0 - PRODUCTS

Not applicable.

3.0 - EXECUTION

3.1 Inspection
Inspect products covered by an allowance promptly upon delivery for damage or defects.

3.2 Preparation
Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

3.3 Schedule of Allowances

Allowance No. 1: Include a contingency allowance of $125,000.00 for the Owner's use throughout the project for unforeseen conditions as directed by the Architect.

Allowance No. 2: Include a contingency allowance of $600.00 per thousand for the purchase of Brick masonry installation and all associated materials shall be included under Base Bid.

Allowance No. 3: Include a quantity allowance of 2,000 cubic yards of replacement of unsuitable soils with compacted structural fill. This Base Bid grading shall include the required cutting and filling of the existing grade to the proposed subgrade elevation. Onsite Geotechnical engineer shall determine if unsuitable soils are present. Refer to Section 02300 for complete information.

Allowance No. 4: Include a contingency allowance of $50,000.00 to provide Fire Department Radio Transponder.

Allowance No. 5: Include a contingency allowance of $10,000.00 as an AID -to-Construction for utility fees.

Allowance No. 6: Include a contingency allowance of $25,000.00 under Base Bid for Security Cameras and Security Devices not otherwise indicated as directed by the Architect. The balance of all associated work, including installation, shall be provided as indicated under Base Bid.

Allowance No. 7: Include a contingency allowance of $30,000.00 for providing materials and labor for an additional irrigation system and associated Landscaping not otherwise indicated to be installed at the direction of the Architect throughout the project at single or multiple locations of any divisible quantity.

END OF SECTION

1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary (Special) Conditions and Modifications and other Division - 1 Specifications Sections, apply to work of the Section.

1.2 Project / Work Identification

Project name is New Gymnasium Addition to Montevallo High School

A. General Description:

1. In general, the project shall consist of selective demolition and new construction including, but not limited to:

   Site work, new single-level, concrete block wall construction, with brick veneer, aluminum windows and aluminum storefront system, TPO roof on composite deck system, on pre-engineered structural metal frame, interior concrete block wall and paint finish, acoustical tile ceiling, wall finishes, plus plumbing, mechanical and electrical work as required to perform the work under this Contract for Montevallo High School and to properly join, connect and finish the new work to bring all to final, finished completion in first class manner ready for use by the Owner, all in strict accordance with Contract Documents including plans and specifications as prepared by Lathan Associates Architects, P. C., Hoover, Alabama; and shall include the furnishing of all labor, materials, equipment and services necessary for the proper completion of the building and other work as called for in the drawings and / or specifications dated October 23, 2025.

2. The Base Bid shall include all work shown or specified.

3. See Section 01010 for Alternates.

4. See Section 01020 for Allowances.

5. It is the intent and requirement under this Contract to accomplish all demolition and preparation necessary to perform the Work under this Contract and to properly join, connect and finish the new work to bring all to final, finished completion in first class manner ready for use by Owner.

B. Contractor's Duties: Except as specifically noted, provide and pay for:

1. Labor, materials and equipment.

2. Tools, construction equipment and machinery.

3. Water, heat, conditioning and utilities required for construction shall be provided by the Contractor.

4. Other facilities and services necessary for the proper execution and completion of the Work. Including hoist if same required for access to site. Provide own telephone service and sanitary portable toilet facilities.

5. Secure and pay for permits, impact fees, government fees, and licenses. This will include, but not be limited to, all permits required by ADEM , the

U.S. Army Corp of Engineers and all fees required by State of Alabama, Division of Construction Management.

6. Give required notices.

7. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of the Work.

8. Promptly submit written notice to the Architect of observed variance of Contract Documents from legal requirements. It is not Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations.

9. Enforce strict discipline and good order among employees. Do not employ unfit persons or persons not skilled in assigned tasks. **Smoking is prohibited on site.**

10. It is intended that all items and systems shown or specified be furnished and installed complete and fully operational when all work is in place and in use. Where more than one trade is involved, the General Contractor shall be responsible for coordination and resolution of disputes between his subcontractors and material suppliers regarding responsibility for furnishing and installing individual parts, systems, materials, connections, proper separation, hardware, adapters, surface preparation, relationship conflicts, supports, blocking and all similar items required for the complete and fully functional weathertight installation of the work.

C. Related Contract Documents:

Related requirements and conditions that are indicated on the Contract Documents include, but are not necessarily limited to, the following:

1. Existing site conditions and restrictions on use of the site.

2. Alterations and coordination with existing work.

3. Work to be performed concurrently by the Owner.

4. Work to be performed concurrently by separate contractors.

5. Work to be performed subsequent to work under this Contract.

6. Equipment / Material assigned as work of the Contract.

7. Requirements for partial Owner occupancy prior to substantial completion of the Contract Work.

8. Safety for and protection for occupancy, operation of existing facilities and construction to remain.

D. Summary by References:

Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary (Special Requirements) Conditions, Specification Sections, Drawings, addenda and modifications to the Contract Documents issued subsequent to the initial printing of the project manual and including, but not necessarily limited to, printed material referenced by any of these.

It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions and other forces outside the Contract Documents.

E. The Owner may provide certain items of furniture, equipment, etc. Coordinate for utility rough-in and / or installation.

1.3 Contractor's Use of Premises:

A. General:
During the entire construction period the Contractor shall have the exclusive use of that portion of the phased contract work limits for construction operations, in accord with approved phasing plan schedule.

The Contractor shall limit his use of the premises to the work indicated, so as to allow for Owner occupancy and use by the public.

Use of the Site:
Confine operations at the site to the areas and limits permitted under the Contract and by law, ordinances, permits, and special conditions and special project procedures and coordination sections of the documents. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

1. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials.

2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off site. Storage of material in the phased contract work limits shall be confined to noncombustible / non-hazard material that is scheduled for immediate use (no longer than 24-hour storage).

3. Lock mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place. Release hydraulic pressure when equipment is not in use. All vehicles delivering materials to the site shall be manned at all times, no exception.

B. Confine operations at site to areas and limits permitted by law, ordinances, permits, Contract Documents and SUPPLEMENTARY CONDITIONS.

C. Assume full responsibility for insurance, protection and safekeeping of products stored on premises.

D. Coordinate with the Owner and schedule deliveries and unloading to prevent traffic congestion blocking of access or interference with Work. Arrange deliveries to avoid larger accumulations of materials than can be suitably stored at site.

E. Contractor to pay for, or satisfactorily repair, all damages incident to their Work, to sidewalks, streets, other public or private property, or to any public utilities occurring during period of work under Contract.

F. Owner furnished and installed items that may require coordination between this General Contractor and Owner assigned agent. Contractor should also verify requirements for utility rough-ins for Owner furnished equipment.

G. Contractor shall maintain all existing adjacent building exits passable for emergency pedestrian egress.

1.4 Owner Occupancy / Partial Owner Occupancy:

The Owner reserves the right to place and install equipment as necessary in completed areas of the building and to occupy such completed areas prior to substantial completion, provided that such occupancy does not substantially interfere with completion of the work. Such placing of equipment and partial occupancy shall not constitute acceptance of the work or any part of the work.

1.5 Alterations and Coordination:

A. General:

The work of this contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from beginning of construction activity through project close-out and warranty periods.

B. Alterations:

Where applicable, requirements of the Contract Documents apply to alteration work in the same manner as to new construction.

C. General:

To expedite delivery and for other purposes in his own best interests, the Owner, before the date of the Contract, may negotiate purchase orders or make other commitments with supplies of material and equipment to be incorporated into the work by the Contractor. These purchase orders and commitments will be assigned to the Contractor for installation.

1.6 Miscellaneous Provisions (to include, but not be limited, by the following):

A. Provide all rough-in and utility connections for all Owner Furnished Equipment and all new plumbing fixtures, new kitchen equipment and for all new electrical fixtures, switches and outlets, etc.

B. Complete Plumbing, Heating, Ventilating, Air Conditioning, and Electrical systems.

C. Preparation of new finishes as called for in Finish Schedule and related specified Sections.

D. Rework and refinish those areas including ceiling tile and grid disturbed by work of Divisions 15 and 16, cutting and patching as required for these specifications. Strict coordination with the Architect and Owner's assigned project representative is mandatory.

E. Mechanical / Electrical Requirements of General Work:

1. General:

Except as otherwise indicated, comply with applicable requirements of Division 15 Sections for mechanical provisions within units of general (Division 2 - 14) Work. Except as otherwise indicated, comply with applicable requirements of Division 16 Sections for electrical provisions

within units of general (Division 2 - 14) Work.

Service Connections: Refer to Division 15 and Division 16 Sections for the characteristics of the mechanical and electrical services to be connected to units of general work. Provide units manufactured or fabricated for proper connection to and utilization of available services.
Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.

2. Electrical Requirements:
Except as otherwise indicated, comply with applicable provisions of The National Electrical Code (NEC) and standards by National Electrical Manufacturer's Association (NEMA), for electrical components of general work. Provide Underwriters Laboratories listed and labeled products where applicable. See Division 16 and electrical drawings.

F. Performance Requirements for Completed Work
The Contract Documents indicate the intended occupancy and utilization of the building and its individual systems and facilities. Compliance with governing regulations is intended and required for the work and for the Owner's occupancy and utilization. In addition to the requirement that every element of the work comply with applicable requirements of the contract documents, it is also required that the work as a whole comply with the general building performance requirements.

1.7 Utilities for Construction:
Make all arrangements necessary to connect to all utilities required to accomplish work under this contract. The Contractor will be solely responsible for connection to utilities required for construction of this Contract.

A. The Owner shall pay for water and electricity usage bills required for normal construction purposes.

B. The Contractor shall provide reasonable heat, cooling and ventilation within the building as required until the mechanical system has been completed, connected and in operation in the normal sequence of construction. This is not "in addition" to any normal requirement for heating, cooling and ventilation under this Contract, but is to clarify that a subcontractor or a Separate Contractor may benefit from the existence of these systems.

C. Temporary Electrical Lighting and Power:
Until permanent electrical power is installed and until the building lighting fixtures are installed in the normal sequence of construction, the General Contractor will make available in each general area of the contract work, outlets to which the Separate Contractors may connect for temporary lighting and single phase electrical power. The General Contractor will pay all costs for this temporary utility extension and remove this temporary source when permanent electrical lighting and power outlets are installed. When, in the normal sequence of construction, the building lights are installed and connected and the building electrical outlets installed, the use of these shall be available for use by the subcontractor and/or Separate Contractors at no cost to them. All temporary electrical lighting and power for Separate Contractors shall be single phase, except the General Contractor will provide sufficient three-phase service as required for the operation and testing of certain items of Equipment, such as food service equipment. Verify all electrical service and phasing prior to construction.

1.8 Requirements of Separate Contractors will be as follows:

A. Separate Contractors to enter the building site to accomplish his work at the approval of the building General Contractor shall cooperate and coordinate with the General Contractor and shall be subject to the General Contractor as to schedule and locations within the site for him to accomplish his work. The General Contractor is responsible for and is in charge of the building site.

B. The Separate Contractor is entitled to storage, access and work space inside the building in the same manner and subject to the same conditions and requirements as subcontractors for the building contract. The Separate Contractor will be advised of the availability of storage space (location coordinated by the General Contractor), and of responsibility to vacate and clean in time for final finish work.

C. Separate Contractors are liable for any damage to the building. The Separate Contractor shall immediately make good any stain, harm or damage to the building caused by his forces. Most particularly, his attention is directed to need for caution in not damaging ceiling tile and wall finishes. Before final payment will be made to a Separate Contractor, he must have settled with the building General Contractor for any damage done.

D. Separate Contractor must provide own toilet and telephone facilities (or make arrangements with the General Contractor as to pay rent for his share of cost).

E. Separate Contractor to make provisions for his own safety and to accomplish his work in compliance with all National and Local Safety Regulations.

F. Remove own trash and debris; each Separate Contractor to completely remove all trash and debris, caused by his work, from the building, and from the site.

G. Do not allow dust to be exhausted through mechanical system.

H. This Contractor to clean building exterior and interior as outlined in Section 01700-CLEAN UP.

1.9 Quality Control

A. Shop Drawings and Product Approval:
Compliance with Shop Drawing checking by the Contractor then submittal for approval to the Architect as required by GENERAL CONDITIONS and SUBMITTALS - SECTION 01350 .

B. Material Approval:
Compliance with SUBMITTALS - SECTION 01350 for submittal of products for approval by Architect before delivery of same to jobsite.

C. Qualifications of Workmen:
In acceptance or rejection of the work of the Sections specified herein, and in particularly that work involved with the application of finish materials, the Architect will make no allowance for lack of skill on the part of the workmen.

D. Special Inspections:
Compliance with special inspection requirements of the International Building Code

is the responsibility of the General Contractor.

1.10 Patch and Repair Work:
Patch and Repair work under this Contract (in addition to work specified and indicated on the drawings) shall include, but not be limited to, the following:

Maintain fire integrity of walls, floors, ceilings and structure where piercing or openings are made. Use safing material as specified herein for approved UL poke-through applications.

1.11 N.I.C. Items:
Items noted as Not In Contract (N.I.C.) are to be furnished by Owner.

END OF SECTION

The Instructions to Bidders, General Conditions, Modified General Conditions and Special Project Requirements as set forth herein are applicable to the work under every Division and Section of these Specifications.

TIME FOR COMPLETION

All work under this Contract shall be complete and ready for Owner occupancy within Four Hundred Twenty (420) consecutive calendar days from written Notice To Proceed. The work under this contract shall commence within Ten (10) calendar days from date of Notice To Proceed.

TIME IS OF THE ESSENCE

The Owner must occupy the work within the completion time indicated herein. Delivery time for equipment and material provided under this contract shall include lead time for storage and ready installation within time limits of the work. Coordination of Owner furnished/Contractor installed equipment and/or materials shall be considered within time limits of the work.

BID GUARANTY

The base bid proposal shall be guaranteed for a period of Sixty (60) days after date of proposal. Alternate proposals (additive or deductive), if requested, shall be guaranteed for a period of Ninety (90) days after date of signing contract. Unit prices, if requested, shall be guaranteed until the date of final acceptance of the project by the Owner. Upon receipt of the drafted construction contract, the contractor shall have no more than fourteen (14) days to execute and return the construction contract to the architect with all supporting documentation in correct order.

INSURANCE

All projects require Builder's Risk Insurance

OWNER

All papers shall be delivered to the Owner, unless otherwise specified in writing to the Contractor. Wherever the term "Owner" is used in the Specification it shall refer to:

SHELBY COUNTY BOARD OF EDUCATION
P.O. BOX 1910
COLUMBIANA, AL 35051

ARCHITECT

Wherever the term "Architect" is used in the Specifications, it shall refer to:

LATHAN ASSOCIATES ARCHITECTS, P. C.
dba LATHAN MCKEE ARCHITECTS
300 CHASE PARK SOUTH, SUITE 200
HOOVER, AL 35244

who by contract with the Owner, is authorized to prepare all drawings, details, and specifications for this work.

After the award of this contract, supervision of the work will be performed by the aforementioned Architect, his duly authorized representatives, or his duly appointed successor as may be designated in writing to the Contractor by the Owner.

APPLICABLE CODES AND AUTHORITIES

A. Codes

1. The work of this project shall be in accordance with the State Building Code. The

State Building Code adopted by the Division of Construction Management is the 2021 International Code. The following companion codes to the 2021 International Code are also adopted:

a. 2021 – International Existing Building Code.
b. 2021 – International Plumbing Code.
c. 2021 – International Fuel Gas Code.
d. 2021 – International Mechanical Code.
e. 2020 – National Electrical Code (NFPA 70).
f. 2021 – International Fire Code.
g. ANSI/ASHRAE/IES Standard 90.1 – 2013 Energy Standard for Buildings.
h. 2010 – ADA Standards for Accessible Design.
i. 2020 – ICC/NSSA-500 Standard for the Design and Construction of Storm Shelters.
j. 2019 NFPA 72: National Fire Alarm and Signaling Code (NFPA 72).

2. The requirements of the 2010 ADA Standards for Accessible Design supersede the accessibility requirements contained in the International Building Code and ANSI A117.1.

3. Promptly notify the Architect, in writing, if any of the contract documents are in conflict or variance with applicable codes, laws and ordinances. All changes will be made by written addenda or modifications.

B. Precedence of Codes

1. In case of conflict between the State Building Code, local codes, the Life Safety Code enforced by the State Fire Marshal, or other codes, the most stringent requirements shall prevail.

2. All food preparation facilities, private water systems, and sewage disposal systems shall also meet the requirements of and be approved by the applicable county health department.

C. Authorities, including but not limited to:

1. State of Alabama Department of Finance - Division of Construction Management (DCM)

2. Local Municipalities

3. Secure and pay for permits, impact fees, government fees and licenses. This will include, but not be limited to, all permits and/or fees required by ADEM, State of Alabama and the U.S. Army Corp of Engineers.

D. If any work is performed knowing it to be contrary to such codes, law, ordinances, rules and regulations and without notice to the Architect, the Contractor assumes full responsibility therefore and shall bear all costs for compliance thereto.

SAFE SPACE REQUIREMENTS

Reference: Act 2010-746 Safe Spaces in New K-12 Schools and Adoption of the ICC500 and 2020 ACC/NSSA Standard for the Design and Construction of Storm Shelters.

Mandatory Contractor's Statement – The Contractor's Statement of Responsibility provided under Additional Guidance on Safe Space Requirements, (form enclosed) must be completed by the contractor and submitted to the DCM Inspector prior to the start of construction. A copy of the Quality Assurance Plan must be attached to the Contractor's Statement.

FIRE ALARM REQUIREMENTS

The Certified Fire Alarm Act requires that every business who installs fire alarm systems in commercial occupancies must be licensed as a Certified Fire Alarm Contractor. The contractor must have a NICET Level III Technician in a position of responsibility, and the license will be issued in the name of the certificate holder and the contractor. The Certified Fire Alarm Act also requires that technicians working for the Certified Contractor must hold a current NICET Level II or equivalent certification. Contractors wishing to bid on fire alarm work must show evidence at the pre-bid conference that he/she meets the certification requirements of the Act and holds a permit issued by the State Fire Marshal.

Act 2009-657, effective August 1, 2012, requires fire alarm contractors to be permitted through the State of Alabama Fire Marshal's Office. In accordance with §34-33A-9, if a fire alarm contractor is going to do work in State of Alabama, the contractor must deliver to the local building official a copy of their State Fire Marshal's Fire Alarm Permit. In addition, the DCM requires the following:

For work involving fire alarm systems, General Contractors must provide a copy of the fire alarm contractor's State Fire Marshal's Fire Alarm Permit to the DCM Inspector at the pre-construction conference.

NONRESIDENT BIDDERS

Nonresident bidders must accompany any written bid documents with a written opinion of an attorney at law licensed to practice law in such nonresident bidders' state of domicile, as to the preferences, if any or none, granted by the law of that state to its own business entities whose principal places of business are in that state in the letting of any or all public contracts.

PRE-BID CONFERENCE

A conference of intended bidders may be held by the Owner prior to the time for the opening of bids for the purpose of presenting and explaining the policies of the Board. Notification of date and place for conference shall be given by written addenda.

PRE-CONSTRUCTION CONFERENCE

A conference shall be held at the job site no later than two weeks following the date of "NOTICE TO PROCEED". The purpose of this conference is to define the duties and responsibilities of the Architect, Owner, Contractor and The State of Alabama Department of Finance - Division of Construction Management. All forms, procedures, schedules and other pertinent requirements will be discussed.

The pre-construction conference can be scheduled once the construction contract is fully-executed. Benchmarks must then be met for required inspections listed in the Pre-Construction Conference Checklist including periodic and special inspections when applicable, final inspections, and year-end inspections. $750K or Less projects with a contract awarded on or after 10/01/22 are exempt from Permit Fees. A copy of the check List is provided along with a Sample of the Pre-Construction Conference Agenda.

PRE-ROOFING CONFERENCE

A Pre-Roofing Conference is required before any roofing materials are installed. This conference shall be conducted by a representative of the Architect and attended by representatives of the Owner, DCM Inspector, General Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable), and the Roofing Materials Manufacturer. If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting.

The Pre-Roofing Conference is intended to clarify demolition (for renovation or re-roofing projects) and application requirements for work to be completed before roofing operations can begin. This would include a detailed review of the shop drawings, submittal data and samples. If conflict exists between the specifications and the Manufacturer’s requirements, this shall be resolved. If this Pre-Roofing Conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case, should the work proceed without inspection of all roof deck areas and substantial agreement on all points.

The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty isn't provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.

The following are to be accomplished during the conference:

1. Review all Factory Mutual and Underwriters Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise.
2. Establish trade-related job schedules, including the installation of roof-mounted mechanical equipment.
3. Establish roofing schedule and work methods that will prevent roof damage.
4. Require that all roof penetrations and walls be in place prior to installing the roof.
5. Establish those areas on the job site that will be designated as work and storage areas for roofing operations.
6. Establish weather and working temperature conditions to which all parties must agree.
7. Establish acceptable methods of protecting the finished roof if any trades must travel across or work on or above any areas of the finished roof.

The Architect shall prepare a written report indicating actions taken and decisions made at this Pre-Roofing Conference. This report shall be made a part of the project records and copies furnished to the General Contractor, the Owner, The State of Alabama Department of Finance - Division of Construction Management and the DCM Inspector.

Regardless of whether or not the sample warranty has been submitted to the Architect, a copy of the warranty must be provided to the DCM Inspector by the Manufacturer at this Pre-Roofing Conference.

PRE-FINISHES CONFERENCE

If elected by the Architect, a conference shall be held at the job site within two weeks prior to the installation of finishes. All Contractors involved with finish work are required to attend. The purpose of this conference is to discuss finish work, coordination issues, the Owner's and Architect's expectations of quality and workmanship and the position of the Owner and Architect regarding poor quality and workmanship. This conference must be scheduled two weeks in advance of any finish installation.

LIST OF SUBCONTRACTORS AND PRINCIPAL MATERIAL SUPPLIERS

A copy shall be prepared by the successful Contractor and delivered to Architect within **Twenty-Four (24) hours after bid**. List shall show following information on each Subcontractor and/or Supplier:

A. Name of Subcontractor and/or Supplier
B. Complete mailing address
C. Telephone Number
D. Person to contact and position in organization
E. Scope of Work to be performed by Subcontractor and percent of total contract.
F. For work involving fire alarm systems, General Contractor's must submit a copy of the Fire Alarm contractor's State Fire Marshall's Fire Alarm Permit at the same time as submission of the subcontractor and supplier list to Architect. The architect or engineer shall reject fire alarm contractors who cannot provide a copy of the required permit.

This list may also be emailed to submittals@lathanassociates.com.

PROGRESS SCHEDULES AND CHARTS

One hard copy prepared by Contractor and delivered to Architect at beginning of job. Five (5) additional copies must be submitted with each monthly request for payment showing actual progress. The schedule shall be in the form of an Analog Bar Chart Schedule of suitable scale to indicate appropriately the percentage of work scheduled for completion at any time. The Contractor shall enter on the Chart his actual progress, preferably at the end of each week, but in any event, at the end of each month, and deliver to the Architect five (5) copies thereof and attach one to his monthly Application for Partial Payment.

CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule. Submit within 30 days of the date established for "Commencement of the Work".

1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the "Schedule of Values".

2. Within each time bar indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicated graphically sequences necessary for completion of related portions of the work.

5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

B. Work Stages
Indicate important stages of construction for each major portion of the work, including testing and installation.

C. Cost Correlation
At the head of the schedule, provide a two-item cost correlation line, indicating "precalculated" and "actual" costs. On the line show dollar-volume of work performed as of the dates used for preparation of payment requests.

D. Distribution
Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

When revisions are made, distribute 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 construction activities.

E. Schedule Updating and Progress Photographs

Revise the schedule after each bi-weekly meeting or activity, where revisions have been recognized or made. Issue the copies of updated schedule concurrently with progress photographs and report of each meeting to the Owner and Architect.

NOTICE OF SALES AND USE TAX EXEMPTION

The Owner is a tax-exempt agency. Materials incorporated into the Work are exempt from sales and use tax, therefore Contractor shall NOT include sales and use taxes in his Bid. Pursuant to Alabama Act No. 2013-205 (effective 5/9/2013), Contractors bidding the Work shall be required to attach "Accounting of Sales Tax" (DCM) Form C-3A-Sales Tax) to their Bid. **FAILURE OF THE CONTRACTOR TO COMPLETE THIS ATTACHMENT TO BID PROPOSAL FORM INDICATING THE SALES TAX AS REQUIRED BY ACT 2013-205, SECTION 1 (g) SHALL RENDER THE BID NON-RESPONSIVE**.

It shall be the responsibility of the successful Contractor and any Subcontractor working under the same contract to apply for a Certificate of Exemption from the Alabama Department of Revenue for this specific project and to comply with all ADOR rules and regulations. The Owner shall not consider claims for additional costs resultant of the Contractor's or its subcontractors' failure to comply with such rules and regulations.

However, the Owner may elect to issue Form ST: PAA1 Purchasing Agent Appointment which appoints the Contractor as Agent to purchase materials Tax-Exempt. In this case, invoices must be transmitted for direct payment by the Owner.

DAMAGE TO PROPERTY

A. The Contractor shall be solely responsible for all work of this contract prior to such work achieving official Substantial Completion as per ARTICLE 32 of the General Conditions of the Contract; and for providing adequate insurance, including: project specific Builder's Risk Insurance and Flood Insurance to cover the following:
   1. Any damage to or loss of stored materials.
   2. Any damage to or loss of in-place work.
   3. Any damage to or loss of any portion of on-site or off-site property, existing or new, resulting from failure of or omission of protective measures; or caused by the work of this contract, including but not limited to: property, furnishings, contents or loss of revenue.

   The Contractor shall be further responsible for promptly correcting or remedying of any such damage or loss; and shall exercise all reasonable measures to minimize any resulting delays to the projects original completion schedule.

B. Damaged work shall be considered Defective Work.

USER FEES - CONTRACTOR

The State of Alabama Department of Finance - Division of Construction Management has adopted a new rule, Administrative Rule 170X-8 Collection of User Fees. The full text of Administrative Rule 170X-8 is available on The State of Alabama Department of Finance - Division of Construction Management's website. It is the responsibility of the General Contractor to visit The State of Alabama Department of Finance - Division of Construction Management website to verify these rules.

PERMIT FEE

A permit fee will be required for projects exceeding $750,000. All projects will be inspected by The State of Alabama Department of Finance - Division of Construction Management. The permit fee is outlined in the Administrative Rule 170X-8.

DCM Form C-8, "General Conditions of the Construction Contract", Article 44, Para. A, states the following:

> "Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and all inspections necessary for proper execution and completion of the Work which are customarily secured after award of the Construction Contract and which are in effect on the date of receipt of bids."

For public works projects falling under The State of Alabama Department of Finance - Division of Construction Management's jurisdiction and bid after October 1, 2014, the Architect shall include a copy of The State of Alabama Department of Finance - Division of Construction Management user fee schedule in the project manual and specify that the permit fee is to be included in the contractor's bid and paid by the Contractor.

The Pre-Construction Conference cannot be held until both (1) the permit fee and (2) the signed construction contract has been received by The State of Alabama Department of Finance - Division of Construction Management.

PERMIT FEE SCHEDULE WORKSHEET	
Cost Categories	**Permit Fee Calculation**
Less than $1000	N/A
$1001 – $50,000	Cost of the Work minus $1,000 = _____/1000 x $5.00 = _____ + $15.00 = Permit Fee Due
$50,001 – $100,000	Cost of the Work minus $50,000 = _____/1000 x $4.00 = _____ + $260.00 = Permit Fee Due
$100,001 – $500,000	Cost of the Work minus $100,000 = _____/1000 x $3.00 = _____ + $460.00 = Permit Fee Due
$500,001 and up	Cost of the Work minus $500,000 = _____/1000 x $2.00 = _____ + $1,660.00 = Permit Fee Due

INSPECTIONS

Scheduling - The contractor will contact the architect by e-mail at inspections@lathanassociates.com of the date the project will be ready for an inspection.

- The Architect will contact The State of Alabama Department of Finance - Division of Construction Management (DCM) Inspector to schedule the first available date for the inspection. Inspections must be requested minimum 14 days in advance.

- When the DCM Inspector confirms the inspection time, the Architect will send an e-mail confirming the inspection time and date.

- Cancellations of any scheduled inspection must be received in writing by e-mail no less than 48 hours prior to the scheduled inspection. If an inspection is cancelled, it will be rescheduled subject to the DCM Inspector's availability.

- If an inspection is cancelled less than 48 hours prior to the scheduled inspection, the re-inspection fee of $1,500 will be charged to the General Contractor.

- If an inspection is held and the project is not deemed ready for inspection or it does not pass the inspection, a re-inspection fee of $1,500 will be charged to the General Contractor.

Minimum Requirements - The following minimum requirements listed below are provided to aid the contractors and architect in determining if a project is ready for a required inspection.

- Pre-Construction Conference
    - Required Attendees: Contractor, Owner, Architect, Major Subcontractors, DCM Inspector

    - Inspection Requirements:
        - Signed construction contract
        - Verification of payment of permit fee
        - Fire Alarm Contractor's Certification (from State Fire Marshal)
        - ADEM permit, if more than 1 acre of land is disturbed

- Pre-Construction Conference for Storm Shelter
    - Required Attendees: Contractor, Owner, Architect, Structural Engineer, Major Subcontractors, Special Inspections Representative, DCM Inspector

    - Inspection Requirements:
        - DCM Inspector must have already received Contractor's Statement of Responsibility and Quality Assurance Plan

- Pre-Roofing Conference
    - Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative, DCM Inspector

    - Inspection Requirements:
        - Roofing submittals must be approved by the architect prior to Pre-Roofing Conference
        - Roofing manufacturer must provide documentation that roof design and roofing materials meet code requirements for wind uplift and impact resistance
        - Copy of sample roofing warranty

- Above-Ceiling Inspections
    - Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors DCM Inspector

    - Inspection Requirements:
        - All work must be completed except for installation of ceiling tiles and/or hard ceilings
        - Space must be conditioned
        - Permanent power must be connected unless otherwise arranged with the DCM Inspector
        - Grease duct must be inspected and approved by the DCM Inspector prior to fire wrapping and Above-Ceiling Inspection

- Life Safety Inspections and Final Inspections
    - Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshal, DCM Inspector

    - Inspection Requirements:
        - Fire alarm certification
        - Kitchen hood fire suppression system certification

- Provide Smoke Machine for testing of Duct Detectors
- General Contractor's 5-Year Roofing Warranty (DCM Form C-9)
- Roofing manufacturer's guaranty
- Above ground and below ground sprinkler certifications
- Emergency and exit lighting tests
- Fire alarm must be monitored
- Elevator Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor
- Boiler/Vessels Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor
- Flush test for underground sprinkler lines (witnessed by local fire marshal, fire chief and/or DCM Inspector)
- Flush/pressure test for new and/or existing fire hydrants
- Must have clear egress/access and emergency (for first responders) access to building
- Must have ADA access completed

- Year-End Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers, DCM Inspector and /or Major subcontractors may also be required to attend

  - Inspection Requirements:
    - Owner 's list of documented warranty items

MATERIALS
ALL MATERIALS FOR THIS PROJECT SHALL BE ASBESTOS FREE.

PROTECTION OF WORK AND PROPERTY
Contractor shall confine his operations to the project work limits of this contract and shall maintain required exit and fire safety requirements as well as Owner's security requirements. Protect adjoining spaces and cause no damage to same; any damage to be immediately repaired.

A. Protection of Work and the Public
Provide adequate protection, in full accordance with local, State and Federal regulations, for the work in progress as well as for the public and others using the site, until the completion of all work.
Provide suitable signs, signals and barricades against trespassing by individual and take whatever steps necessary or required by law to protect workers and public from harm. Protect the work and the public from damage of any kind during all operations. Methods described herein are minimum standards acceptable except where exceeded by Federal, State or local requirements.

B. Safety and Traffic Control Devices During Construction

1. Within the limits of area designated for work under this contract, and any staging or traffic areas, this Contractor shall furnish, install and maintain all safety and traffic control devices during the construction period as described herein, and as required by law.

2. All safety and traffic control devices shall be in compliance with Federal, State and local laws and regulations, and to the requirements and approval of applicable local officials, State Highway Department and the Architect.

3. Wherever the work affects the normal flow of vehicular or pedestrian traffic, traffic control devices shall be in accordance with requirements and standards as set forth in the “Manual on the Uniform Traffic Control Devices for Streets and Highways”,

latest edition, as published by U.S. Department of Transportation, Federal Highway Administration, and Section "G" of the Alabama Manual on Uniform Traffic Control Devices, Volumes I and II, latest edition.

4. Traffic Control Devices. Traffic control devices shall be installed at the inception of the construction operations and shall be properly maintained during the periods of construction. They shall remain in place only as long as they are needed and shall be removed immediately thereafter.

5. All traffic control devices must be approved by the City, County and by all affected enforcing agencies.

6. Protective Construction Site Barricade

   a. Requirements: Contractor shall furnish, install and maintain throughout the life of the Contract, all necessary barricades, covers, scaffold guards, warning signs, warning lights, channelization markers and other protective devices, all as required by Owner, local rules, regulations and ordinances, and as necessary to protect the work from trespassing.

   b. Barricades, enclosing devices and warning lights may be standard rental items of equipment in compliance with these requirements; and shall be of a type that affords security, is quite visible and is easily moved.

   c. Materials for use in construction of site barricades and other protective devices shall be of new exterior plywood and not less than #2 pine structural lumber, all of good appearance, sound, square, straight, in line, braced and well-constructed. All materials, except those to be walked on, shall be painted.

   d. Move barricades from one area to the next as the work progresses. Remove all upon completion.

   e. Lighting on Barricades: Furnish and install traffic warning lights or barricades, in areas of vehicular traffic. Install yellow traffic signal lamps complete with all wiring, switches, disconnects, fusing, sockets, guards and hanging provisions. These lights shall be turned on during all hours of darkness (dusk to dawn). Maintain in service during the construction period; move forward as site of work moves. Remove all upon completion of work.

   f. See also erosion control requirements of Earthwork Section 02300.

   g. **Unauthorized visitors not permitted within working and storage areas.** OSHA approved suitable personal safety devices are to be provided for authorized visitors within working areas. Suitable fire extinguishing equipment, readily accessible from any part of the work, to be provided and maintained. Erect any and all required additional protective barriers, lights, etc., as necessary for safety and protection. Keep area of work closed off when not in use.

C. Utilities

1. See Section 01025 for Utility usage billing.

2. Other utility bills caused by work of the contract are to be paid by Contractor as outlined in the SUMMARY OF THE WORK. Contractor to provide own telephone,

temporary heat and pay costs for same. Contractor to pay for any sewer impact fee as related to this project. All project related sanitary conditions are the responsibility of the Contractor.

3. Contractor must investigate and verify the existence and location of all site utilities in the field before starting work. Flag on site all underground service lines in the construction area. Notify the Architect of any condition which, in the Contractor's opinion, may interfere with the completion of work as designated. Excavating in the vicinity of existing utilities shall be done carefully and by hand. Maintain and protect existing utilities.

4. The Contractor is responsible for all temporary utility connections to utilities.

D. Protection of Materials

Properly and effectively protect all materials and equipment, before, during and after their installation. Contractor will be allowed to store materials, equipment, etc., on the site. Security of the area(s) will be the sole responsibility of the Contractor. **Protect materials such as insulation and insulated duct from rain exposure.**

E. Watchman

The Contractor, at his own expense and option, may employ a watchman at such time as he deems necessary to protect his work and/or materials.

DAMAGE TO PROPERTY

The contractor will be responsible for, and insure against, any damage to property, furnishings, and/or loss of revenue resulting from any damage to any part of the existing property caused by the work of this Contract.

SPECIAL SAFETY REQUIREMENTS

All exitways shall be maintained free and clear of all stored materials, debris, etc.

No combustible construction materials shall be stored in the Project area after the day's work is complete. Remove any potentially hazardous materials immediately to prevent any fire hazards which may result from the construction of this Project. In addition, precautions shall be made by the General Contractor to prevent any other activities at the site which may constitute a fire hazard.

In addition to any portable fire extinguishers existing in the building, the General Contractor shall provide additional fire extinguishers during the construction as required.

Refer to the General Conditions for additional safety requirements.

USE OF PREMISES, SANITARY PROVISIONS

Refer to SECTION 01035, SPECIAL PROJECT PROCEDURES, for use of premises, sanitary provisions which are specifically related to this project. Note that sanitary conditions are the responsibility of the Contractor.

All personnel required on the job site must at all times be in possession of **state issued** photo identification subject to examination by Owner or their representative. Other security or evacuation requirements may also be in place and is the responsibility of the General Contractor to abide by all school rules.

USE OF OCCUPIED PREMISES

During execution of this Contract, clear passages must be maintained as described along corridors. Owner will endeavor to keep personnel and visitors from work areas, but it will be the Contractor's responsibility to enforce all safety precautions.

CUTTING AND PATCHING

All excavation and cutting of new work to accomplish the work shall be by the respective trades. It is to be noted that Divisions 15 and 16 each are required to perform the necessary cutting of floors, walls, ceilings as necessary to install the work of their trade, all under the direct supervision of the General Contractor and in accordance with the construction schedule. The General Contractor is responsible for the repair, replacement and finish of pavement, roofs, floors, walls and ceiling (all finish work); and same shall be accomplished by competent workmen and finish up in a neat manner, by craftsmen skilled in their work, all to be equal in quality and appearance of adjacent work. Finished installation shall comply with specified tolerances and finishes. The Contractor shall not cut, excavate, or otherwise alter any work in a manner or by a method or methods that will endanger the work, adjacent property, workmen, the public or the work of any other Contractor.

In acceptance or rejection of the work of the Sections involved in the application of finish materials, the Architect will make no allowance for lack of skill on the part of the workmen.

When necessary to cut, or alter completed work to accommodate subsequent work, the Contractor performing the work previously in place shall do such cutting and repairing.

Cost of cutting and repairs necessitated by fault of negligence, or for other reasons, shall be borne by the Contractor at fault in requiring such work.

If a Contractor or Subcontractor fails to do necessary cutting or fails to have restored any work of others damaged by him, for a period of time causing delay in project construction, the Owner may do so and cost thereof shall be charged to the General Contractor.

Cutting of structural members will not be permitted.

FIRE INTEGRITY OF CONSTRUCTION shall be maintained whenever components of rated assemblies are penetrated, jointed, cracked or compromised in any way either intentionally or unintentionally; including, but not limited to: walls, floors, ceilings and caps. Rated walls shall extend and key to floor, cap assembly or roof deck above using consistent materials.

Openings for “poke-through” pipe, conduit, etc., penetrations shall be of minimum size in accordance with UL published requirements for maintaining integrity of rated construction and fire sealed properly. Mortar or concrete in contact with copper will not be accepted. Expansive spray foam fill which is combustible shall not be allowed.

Opening shall be sealed full thickness of penetration, (i.e., grout solid up to within one (1) inch of finish surface then seal with rated sealant material). Any and all pipe and conduit penetrations of a finished wall, floor or ceiling materials shall be finished out with an approved escutcheon plate. Any penetration of rated walls or ceilings by mechanical ductwork shall be protected by use of rated fire damper system at point of penetration. Provide for collars as required at point of penetration through rated construction. Contractor shall provide fire integrity sign on rated wall construction (above ceiling) lines in accordance with the building code, and as outlined in PAINTING - SECTION 09910.

If specified under FIRESTOP CAULKING AND SEALING - SECTION 07840, fire caulking and sealing shall be **single source** provided using same approved materials and certified technicians throughout the project. All applicable trades shall coordinate accordingly and make their work ready to properly receive fire sealant. If fire sealing is not specified under a separate section, then all applicable trades shall fire seal their own work using the same mutually agreed upon fire sealing materials consistently throughout the project installed by manufacturer's certified technician(s). Acceptable fire sealing materials include, but are not limited to: Dow-Corning, 3-M Brand, Tremco meeting ASTM 3-119, ASTM 3-814 and mineral wool fiber safing.

USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY OWNER

A. Contractor agrees to permit Owner to use and occupy portions of building or Project before formal acceptance by Owner, provided that Owner:

1. Secures written consent of Contractor (except in event that in the opinion of Architect, Contractor is chargeable with unwarranted delay in final completion of contract requirements).

2. Secures endorsement from insurance carrier and consent of the surety, permitting occupancy and use of portions of project during remaining period of construction.

B. Use and occupancy prior to formal acceptance shall not relieve Contractor of his responsibility to maintain insurance coverage, as called for in specifications, for benefit of Owner, Owner's Agent, Contractor and all Subcontractors until Project is completed and accepted by Owner. However, use and occupancy of any area by the Owner prior to project completion shall mean partial acceptance of that area and any equipment within that area used by the Owner, thereby requiring a substantial completion agreement between the Owner and the Contractor for said area and equipment.

PROJECT SIGN

A. The General Contractor will erect a sign at the project site identifying the project. Wording for sign to be provided by the Owner through the Architect. Sign to be constructed of 3/4" x 4' x 8' exterior grade plywood with treated wood trim surround, mounted on two (2) 4" x 4" x 8'-0" treated wood posts, bottom of sign to be 3'-0" above finish grade. Sign painted with two coats best exterior grade alkyd paint before letters and graphics are painted on. Option: In lieu of painted lettering on plywood, a corrugated plastic sign (displaying the same lettering, layout and colors as above) may be secured directly to the unpainted exterior grade plywood.

B. Sign shall be single sided.

C. Location of sign to be coordinated with Architect and Owner and placed in a prominent location easily readable from existing street or roadway. Sign to be maintained in good condition until completion of Project. No other signs will be allowed on Project Site without the written approval of the Owner, issued through the Architect.

D. See DCM Form C-15 for PSCA Projects.

END OF SECTION

1.0 Requirements

As set forth herein are applicable to the Work under every Section or Division of this Specification, of the General Contractor and all Subcontractors.

1.1 Completion Date

Work under this contract shall be sufficiently completed to permit Owner to occupy the building, or a designated portion thereof, on or before date stipulated on the Proposal Form and accepted by Owner. See Paragraph entitled Time For Completion under SPECIAL PROJECT REQUIREMENTS, SECTION 01030.

1.2 Acceptance of Preceding Work

Before starting any operation, Contractor and each Subcontractor shall examine existing work performed by others to which his work adjoins. Failure to remedy faults in or notify Architect of deficiencies or faults in preceding work will constitute acceptance thereof and waiver of any claim of its unsuitability.

1.3 Layouts and Levels

General Contractor shall establish principal lines, grades, levels and corners, and shall set and maintain adequate reference points therefore. Contractor shall lay out own work to dimension from principal lines and shall be responsible for layout of his subcontractor's work.

1.4 Product Approval

A. In addition to items submitted for approval by Shop Drawings, Contractor to submit for approval within ten (10) days after receipt of Notice to Proceed a list of all products proposed for use in the work, listing manufacturer, make, model number, catalog listing subcontractors' and / or vendors' names, and other manufacturers' identification for each particular product for each particular use. Submit in letter form in 3 copies, and approval obtained before material is ordered. Submit list of products requiring color selection. Approved list of products manufacturer and / or vendor will be returned promptly in order to avoid any delay of ordering materials specified. General Contractor shall review with Architect and the Owner the actual status of availability of all materials and schedule of work in the building, (including Alternates).

B. Submit complete Product Data and testing results, if requested.

1.5 Weather Protection

Contractor provide, maintain and pay all cost for all weather protection required to properly protect all parts of structure from damage during construction. Note that building heating and cooling system will remain in operation throughout the contract period.

1.6 Manufacturer's Directions

A. Apply, install, connect and erect manufactured items or materials according to recommendations of manufacturer when such recommendations are not in conflict with Contract Documents.

B. Furnish to Architect, on request, copies of manufacturer's recommendations. Secure approval of recommendations before proceeding with work.

ALL MANUFACTURED ITEMS THAT ARE STRUCTURAL IN NATURE SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF ALABAMA AND SUBMITTED FOR APPROVAL.

1.7 Coordination Between Trades: Contractor's Pre-Construction Coordination Meeting

A. Plumbing, Heating, Ventilating, Air Conditioning and Electrical Drawings are diagrammatic.

B. BEFORE COMMENCING WORK UNDER THIS CONTRACT, GENERAL CONTRACTOR IS TO ARRANGE FOR A MEETING OF ALL MAJOR SUBCONTRACTORS (AND SEPARATE CONTRACTS AS APPLICABLE) TO DETERMINE THAT ALL ITEMS WILL FIT INTO SPACES PROVIDED, HEADROOMS MAINTAINED, CONCEALMENT REQUIRED, WALL THICKNESS SUFFICIENT FOR RECESS OF ITEMS, PRIORITIES ESTABLISHED IN INSTALLATION OF DUCTS, PIPING, ETC. **EACH SUBCONTRACTOR MUST HAVE THEIR RESPECTIVE ON-SITE JOB FOREMAN PRESENT.** Each Subcontractor to have drawings of all trades, and to be completely aware of and fully informed of, requirements and locations of work to be installed by other Subcontractors. In case of disagreements in locations, General Contractor is to settle same, giving preference to ductwork and larger items, except where grading of pipe may require preference. All decisions to be recorded on each Subcontractor's drawings and on jobsite set of drawings and fully inform all Subcontractors. No changes to be made which affect finish locations or alter requirements of contract without approval of the Architect. Do not cover or block previously installed alarm devices, valves, etc., without providing for access to same.

C. If, in any location, it is impossible to install required items and maintain requirements as to ceiling heights, clearances dimensions, etc., or due to structural interference, General Contractor is to advise Architect for a decision.

1.8 City Ordinances

A. Comply with all City rules, regulations and ordinances in regard to parking, unloading, blocking of street, sidewalk or alley; and provide all lights, barriers, temporary walkways, protection, etc., as necessary for complete compliance.

B. Comply with applicable Code and all local and Federal laws and ordinances in regard to safeguards during construction and fire protection, and all governing regulations pertaining to requirements during construction.

1.9 Operating and Maintenance Instructions

A. Contractor shall instruct Owner's operating personnel in proper operation, lubrication and maintenance of all equipment items installed under this contract.

B. At completion of job, Contractor shall provide three (3) copies of a brochure containing manufacturer's operating, lubricating and maintenance instructions and parts lists for each item of equipment furnished under this contract. Each copy shall be assembled and bound under a substantial hardboard cover with title and index. Provide a complete set of approved manufacturer's and contractor's shop and equipment "setting" drawings for major systems and equipment furnished under this contract.

One (1) copy of the Operating and Maintenance instructions shall be hand delivered to the Architect at the final inspection and the remaining copies shall be provided to the Owner prior to issuance of the Certificate of Substantial Completion

1.10 Site Limitation and Use

A. General Contractor and each Subcontractor shall note the extent of site available for access and storage. Contractor restricted to those limits.

B. All personnel required on the job site must at all times be in possession of **state issued** photo identification subject to examination by Owner or their representative. Other security requirements may also be in place and is the responsibility of the General Contractor to abide by all school rules.

C. Contractor and Subcontractors are further cautioned that the traffic on adjacent streets may

place strict limitations on the rates and means of delivery of materials, equipment and supplies, the removal of rubbish, and, in some cases, the hours during which deliveries are made.

1.11 Protection of Existing Property Adjacent

A. Protect and cause no damage to adjacent area and site.
During progress of work, Contractor will be responsible for full and complete protection of property which the work is being done, insofar as related to work under this Contract. Any damage to adjacent property, or contents caused by failure in performance with these requirements must be made good by Contractor at his own expense and to the satisfaction of Owner. Any damage to existing adjacent areas outside contract work limits shall be replaced with exact same materials as that damaged.

B. Provide for means to prevent objectionable dust and debris blowing onto adjacent property or streets from work being accomplished under this contract.

1.12 Dimensions

Contractor and each Subcontractor shall verify dimensions at site for built-in work, for work adjoining that of other trades and for dimensions shown to existing structures or installations. Notify Architect of any discrepancies.

1.13 Security of Construction Area

Contractor shall secure on site storage of materials and equipment. Storage of materials shall be within the Contractor's limit of construction at the site. This General Contractor shall adhere to Owner's requirements for security of work area and under all conditions shall be subject to these security regulations and requirements. Off-site storage of materials and equipment that are to be installed in the project shall be in a bonded storage area as outlined in the General Conditions.

1.14 Delivering and Storage

A. Deliver packaged materials to site in manufacturer's original, unopened and labeled containers. Do not open containers until approximate time for use.

B. Store materials in a manner that will prevent damage to materials or structure, and that will prevent injury to persons. No materials will be stored outside of contract work area by this Contractor.

C. Store cementitious materials in dry, weathertight, ventilated spaces. Store ferrous materials to prevent contact with ground and to avoid rusting and damage from weather.

1.15 Fire Protection

Contractor to take all necessary steps to ensure prevention of fire. Contractor to have portable extinguishers on hand at site throughout the period of construction. Flammable and combustible materials shall be kept in metal cans with tight covers and removed from building at end of each working day.

Fire protection systems within existing buildings must be maintained in full operation during construction.

1.16 Hoist, Ramps, Elevator Access, etc.

Furnish and Maintain as Necessary: Hoists, ramps, railings, platforms, etc., required in conformance with local applicable regulations. Hoists shall be operated by qualified and experienced mechanics. Space for hoist shall be coordinated with Architect and Owner's assigned project representative.

1.17 Chases and Openings

Provide all proper chases, openings and recesses as indicated for work under this Contract. Build

in all sleeves, anchors, etc., for proper engagement of work to be installed. All post piercing of slabs and masonry shall be core drilling.

END OF SECTION

1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary Conditions (plus modifications thereto), and other Division 1 Specification sections, apply to work of this section.

1.2 Description of Work

Minimum administrative and supervisory requirements necessary for coordination of work on the project include, but are not necessarily limited to, the following:

A. Coordination and meetings.
B. Administrative and supervisory personnel.
C. Surveys and records or reports.
D. Limitations for use of site.
E. Special reports.
F. General installation provisions.
G. Cleaning and protection.
H. Conservation and salvage.
I. Special Inspections.

1.3 Coordination and Meetings

A. General

Prepare a written memorandum on required coordination activities. Include such items as required notices, reports and attendance at meetings. Distribute this memorandum to each entity performing work at the project site. Prepare similar memorandum for separate contractors where interfacing of their work is required.

B. Coordination Drawings

Prepare coordination drawings where work by separate entities requires fabrication off-site of products and materials which must accurately interface. Coordination drawings shall indicate how work shown by separate shop drawings will interface and shall indicate sequence for installation.

C. Bi-Weekly Coordination Meetings

Hold bi-weekly general project coordination meetings at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Request representation at each meeting by every party currently involved in coordination or planning for the work of the entire project. Conduct meetings in a manner which will resolve coordination problems. Record results of the meeting and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. At Contractor’s option, bi-weekly coordination meetings can be held integrally with progress meetings.

1.4 Administrative / Supervisory Personnel

A. General

In addition to a General Superintendent and other administrative and supervisory personnel required for performance of the work, provide specific coordinating personnel as specified herein.

B. Project Coordinator

Provide a full-time Project Coordinator experienced in administration and supervision of building construction, including mechanical and electrical work. This Project Coordinator is hereby authorized to act as general coordinator of interfaces between units of work. For the purpose of this provision, “interface” is defined to include scheduling and sequencing of work, sharing of access to work spaces, installation, protection of each other’s work, cutting and patching, tolerances, cleaning, selections for compatibility, preparation of coordination drawings, inspections, tests, temporary facilities and services, scheduling and sequencing of mechanical / electrical work, integration of work placed into limited spaces available for mechanical / electrical installations, each trades’ protection of work by other trades and preparation of mechanical / electrical coordination drawings.

1.5 Surveys and Records / Reports

A. General

Establish markers to set lines and levels for work as needed to properly locate each element of the project. Calculate and measure required dimensions as shown within recognized tolerances. Drawings shall not be scaled to determine dimensions. Advise entities performing work of marked lines and levels provided for their use.

B. Survey Procedures

Before proceeding with the layout of actual work, verify the layout information shown on the drawings, in relation to the existing partitions and conditions. As work proceeds, check every major element for line, level and plumb. Maintain a record of such checks; make this record available for the Architect or Engineer. Record deviations from required lines and levels and advise the Architect or Engineer promptly upon detection of deviations that exceed indicated or recognized tolerances. Record deviations which are accepted, and not corrected, on record drawings.

1.6 Limitations on Use of the Site

A. General

Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements administer allocation of available space equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

B. See also specific requirements of SECTION 01030 - SPECIAL PROJECT REQUIREMENTS and SECTION 01035 SPECIAL PROJECT PROCEDURES.

1.7 Special Reports

A. General

Submit special reports directly to the Owner through the Architect within one day of an occurrence. Submit a copy of the report to the other entities that are affected by the occurrence.

B. Reporting Unusual Events

When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List chain of events, persons participating, response by the Contractor’s personnel, and evaluation of the results or affects and similar pertinent information. Advise the Owner in advance when such events are known or predictable.

C. Reporting Accidents

Prepare and submit reports of significant accidents at the site and anywhere else work is in progress. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

2.0 -PRODUCTS

Not applicable.

3.0 - EXECUTION

3.1 General Installation Provisions

A. Pre-Installation Conferences

Hold a pre-installation meeting at the project site well before installation of each unit of work which requires coordination with other work. Installer and representatives of the manufacturers and fabricators who are involved in, or affected by, that unit of work, and with its coordination or integration with other work that has preceded or will follow shall attend this meeting. Advise the Architect / Engineer of scheduled meeting dates.

1. At each meeting review progress of other work and preparations for the particular work under consideration including specific requirements for the following:

   Contract documents.
   Options.
   Related change orders.
   Purchases.
   Deliveries.
   Shop drawings, product data and quality control samples.
   Possible conflicts and compatibility problems.
   Time schedules.
   Manufacturer's recommendations.
   Compatibility of materials.
   Acceptability of substrates.
   Temporary facilities.
   Space and access limitations.
   Governing regulations.
   Safety.
   Inspection and testing requirements.
   Required performance results.
   Recording requirements.
   Protection.

2. Record significant discussions of each conference, and record agreements and disagreements, along with the final plan of action. Distribute the record of meeting promptly to everyone concerned, including the Owner and Architect / Engineer.

3. Do not proceed with the work if the pre-installation conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene pre-installation conference at the earliest feasible date.

B. Installer's Inspection of Conditions

Require the Installer of each major unit of work to inspect the substrate to receive work and conditions under which the work is to be performed. The Installer shall report all unsatisfactory conditions in writing to the Contractor. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

C. Special Inspections

Coordinate and schedule for Special Masonry Inspections with Masonry Contractor and Owner's Inspector as required to comply with current Building Codes. All grout placement for CMU walls shall be witnessed by the Special Inspector.

D. Manufacturer's Instructions

Where installations include manufactured products, comply with the manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than the requirements indicated in the contract documents.

E. Inspect each item of materials or equipment immediately prior to installation. Reject damaged and defective items.

F. Provide attachment and connection devices and methods for securing work. Secure work true to line and level and within recognized industry tolerances. Allow expansion and building movement. Provide uniform joint width in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable visual-effect choices to the Architect / Engineer for final decision.

G. Recheck measurements and dimensions of the work as an integral step of starting each installation.

H. Install each unit-of-work during weather conditions and project status which will ensure the best possible results in coordination with the entire work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.

I. Coordinate enclosure of the work with required inspections and tests, so as to minimize the necessity of uncovering work for that purpose.

J. Mounting Heights

Where mounting heights are not indicated, mount individual units of work at industry recognized standard and A.D.A. acceptable mounting heights for the particular application indicated. Refer questionable mounting height choices to the Architect / Engineer for final decision. For mounting heights on Owner Furnished Equipment, Contractor shall obtain accurate information from data supplied by Owner or from field measurements of actual equipment to be relocated and installed.

3.2 Cleaning and Protection

A. 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 maintenance. Apply protective covering on installed work where it is required to ensure freedom from damage or deterioration at time of substantial completion.

B. 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 proper operation without damaging effects.

C. Limiting Exposures of Work
To the extent possible through reasonable 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, to the following:

Excessively high or low temperatures.
Thermal shock.
Excessively high or low humidity.
Water or ice.
Solvents.
Chemicals.
Electrical current.
Incompatible interface.
Misalignment.
Unprotected storage.
Theft.
Vandalism.

3.3 Conservation and Salvage
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.

END OF SECTION

1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and General Provisions of Contract, including General and Supplementary Conditions (plus modifications thereto), and other Division 1 Specification Sections, apply to work of this Section.

1.2 Description of Requirements

A. Definition

"Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

1. "Cutting and patching" is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

2. Cutting and patching performed during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".

B. Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

Unless otherwise specified, requirements of this section apply to mechanical and electrical work. Refer to Division 15 and Division 16 Sections for additional requirements and limitations on cutting and patching of mechanical and electrical work.

1.3 Quality Assurance

A. Requirements for Structural Work

Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.

B. Before cutting and patching the following categories of work, obtain the Architect / Engineer's approval to proceed with cutting and patching as described in the procedural proposal for cutting and patching.

1. Structural steel.
2. Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories or work.
3. Structural concrete.
4. Bearing walls.
5. Structural decking.
6. Exterior wall construction.
7. Piping, ductwork, vessels and equipment.
8. Structural systems of special construction, as specified by Division 13 Sections.

C. Where new work is indicated to interface with an existing roofing system or other systems potentially under current warranty, the Contractor shall coordinate as required to verify and provide new work in such manner and with such resources as to maintain the Owners current warranty accordingly without compromise.

D. Operational and Safety Limitations

Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.

E. Before cutting and patching the following elements of work, and similar work elements where directed, obtain the Owner's approval through the Architect / Engineer to proceed with cutting and patching as proposed in the proposal for cutting and patching. Note fourteen (14) day prior notice requirement of Owner.

1. Primary operational systems and equipment.

2. Noise and vibration control elements and systems.

3. Control, communication, conveying and electrical wiring systems.

F. Visual Requirements

Do not cut and patch work exposed on the building's exterior or in its occupied spaces in a manner that would, in the Architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the Architect to be cut and patched in a visually unsatisfactory manner.

1.4 Submittals

A. Procedural Proposal for Cutting and Patching

Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:

1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.

2. List products to be used and firms that will perform work.

3. Give dates when work is expected to be performed.

4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily. Indicate how long utility service will be disrupted. Request day and time desired for disruption of services.

5. Where cutting and patching structural work involves the addition of reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with original structure to satisfy requirements.

6. Approval by the Architect / Engineer to proceed with cutting and patching work does not waive the Architect / Engineer's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

2.0 - PRODUCTS

2.1 Materials

Except as otherwise indicated, or as directed by the Architect / Engineer, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

3.0 - EXECUTION

3.1 Inspection

A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

B. Before the start of cutting work, meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.2 Preparation

A. Temporary Support

To prevent failure, provide temporary support of work to be cut.

B. Protection

1. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.

2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

C. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

3.3 Performance

A. General

Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect / Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.

B. Cutting

1. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.

2. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering, and chopping. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or

abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

C. Patching

1. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

2. Where feasible, inspect and test patched areas to demonstrate integrity of work.

3. Restore exposed finishes of patched areas and, where necessary, extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

4. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.

5. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.

6. Patch and repair existing plaster / gypsum board ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 Cleaning

Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

1.0 GENERAL REQUIREMENTS

Temporary facilities and controls required for this project include, but are not necessarily limited to, the following:

1.1 Temporary Structures

A. Provide and maintain field office separate from the project of not less than 300 sq. ft. in area equipped with the following:

1. Heater or air conditioner as required by weather.
2. Telephone service.
3. Computer with ability and service to send/receive email.
4. Printer
5. Adequate lighting.
6. Plan table, 36” x 60” minimum (2)
7. Plan rack.
8. Desk and chair with lockable file drawer in desk.
9. Toilet facilities: Provide 1 water closet and 1 lavatory.
10. Computer system capable of sending/receiving emails with printer.

B. Within the Contractor’s facilities, provide enclosed space adequate for holding weekly project meetings. Furnish with all required tables, chairs and utilities.

C. The entire facility, including furniture, will remain the property of the Contractor and shall be maintained at the site until 100% completion of the Work.

D. Portable office or trailer meeting above requirements acceptable pending local approval.

1.2 Temporary Facilities

A. Temporary water and electrical service connections will be provided by General Contractor. This Contractor shall make necessary connections and provide conductors and furnish and install area distribution boxes so located that the individual trades may use 30m (100') maximum length extension cords to obtain adequate power and artificial lighting at all points where required for the Work, and for inspection and safety.

B. Cost of temporary water and electric connections and conductors shall be borne by Contractor.

C. Provide temporary toilets in portable units. Toilets must meet standards of the County Public Health Department. Toilets shall be maintained for the duration of the project.

D. Remove temporary utilities on completion of construction.

1.3 Temporary Scaffolds, Lifts, Staging and Stairs

Provide scaffolds, lifts, staging, stairs, ramps, ladders, runways, platforms, hoists and guard rails necessary for execution of construction. Comply with recognized safety rules and prevailing laws or ordinances. Remove on completion of construction.

1.4 Protective Barricades and Temporary Walkways

A. Contractor to provide and maintain all necessary temporary barricades, covers, enclosing fences, walkways, scaffolds, guards, street barricades, etc., in accordance with requirements of SPECIAL PROJECT REQUIREMENTS - SECTION 01030.

Height and location to be in compliance with local codes and ordinances. Provide adequate warning signs and warning lights.

B. Materials for construction shall be substantial, sound, all of good appearance, straight, in line, unyielding, complete, well installed, braced and adequate for use intended. All to comply with requirements of local codes and ordinances including the International Building Code. Provide and install gates and doors in enclosing barricade as required.

C. Remove upon completion of the work.

1.5 Construction Fence

A. Provide 6'-0" high chain link fence around area of work, around staging area, and/or material storage area(s) as directed and/or as deemed necessary for safety. Fence shall be supported on steel posts and maintained in good condition throughout contract period. Remove fence when contract is completed and repair any site damage caused by fence and posts.

B. Fence adjacent to pedestrian and traffic areas as required to safely maintain ongoing school operations subject to the Site Limits and approval of the Owner and the Architect.

C. Provide lockable gates (truck gates and pedestrian gate as required). Locate at Contractor's option. Keep gates closed except during actual ingress and egress.

D. Route fence in behind existing fire hydrants to keep available from street side at all times.

E. Coordinate fence location with Owner prior to installation of fencing and gates. Fencing and gates shall not obstruct the Owner’s daily operation of pedestrian, bus, and or car traffic.

1.6 Protection

Conform to requirements of "Safety & Protection of Persons and Property", in GENERAL CONDITIONS.

1.7 Maintaining Traffic

A. Do not close or obstruct streets, sidewalks, alleys and passageways without permit. Do not place or store material in streets, alleys or passageways.

B. Conduct operations with minimum interference to roads, streets, driveways, alleys, sidewalks and facilities, except as noted herein.

C. Provide, erect and maintain lights, barriers and the like required by traffic regulations or local laws.

1.8 Protection of Structure and Property

A. Execute work to ensure adjacent property against damages which might occur from falling debris or other cause; do not interfere with use of adjacent property. Maintain free, safe passage to and from same.

B. Take precautions to guard against movement, settlement or collapse of any sidewalks or street passages adjoining property; be liable for any such movement, settlement or collapse; repair promptly such damage when so ordered.

1.9 Project Signs

Allow no signs or advertising of any kind on the job site except as specifically approved in advance by the Architect.

1.10 Maintenance and Removal

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect.

END OF SECTION

SECTION 01220 - UNIT PRICES

1.0 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.

B. Proposal Form

1.2 Summary

A. This Section includes administrative and procedural requirements for unit prices.

B. See Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances subject to Architect's approval.

1.3 Definitions

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Unit Prices are for the Owner's use in negotiating the addition or reduction of such materials should actual site conditions warrant a change.

C. All work and materials indicated shall be provided by the contractor within the bid amount accordingly. Unit prices shall not be a consideration for providing work or materials indicated in the scope of work by the contract documents.

1.4 Procedures

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are as specified.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A list of unit prices is included below. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

2.0 PRODUCTS (Not Used)

3.0 EXECUTION

3.1 Unit Price Schedule, (to be quoted on the Proposal Form Attachment)

A. Unit Price No. 1 – Earth Excavation – General Site Conditions
   1. Description: Removal, including all materials and labor, of in-place below grade materials, in accordance with the Contract Documents.
   2. Unit of Measurement: Cubic Yard (CY).

B. Unit Price No. 2 – Earth Excavation – Trench Materials
   1. Description: Removal, including all materials and labor, of in-place trench materials, in accordance with the Contract Documents.
   2. Unit of Measurement: Cubic Yard (CY).

C. Unit Price No. 3 – Unsuitable Soils – Remove/Replace
   1. Description: Undercutting and replacement of unsuitable soils, including all materials and labor, quantified/verified in the field, and in accordance with the Contract Documents.
   2. Refer to Section 02300 for additional information.
   3. Unit of Measurement: Cubic Yard (CY).

D. Unit Price No. 4 – Stabilization Fabric
   1. Description: Placement of heavy-duty stabilization fabric (Mirafi 600X or Equal), including all materials and labor, in accordance with the Contract Documents.
   2. Unit of Measurement: Cubic Yard (CY).

E. Unit Price No. 5 – Lean Concrete
   1. Description: Placement of Lean concrete, including all materials and labor, of in-place trench materials, in accordance with the Contract Documents.
   2. Unit of Measurement: Cubic Yard (CY).

END OF SECTION

1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary (Special) Conditions, and modifications thereto, and other Division 1 Specifications Sections, apply to work of this Section. See Special Project Requirements Section 01030 for pre-installation meetings and pre-finishes meeting.

1.2 Description of Requirements

A. General

Required inspection and testing services are intended to assist in the determination of probable compliance of the work with requirements specified or indicated. These required services do not relieve the Contractor of responsibility for compliance with these requirements or for compliance with requirements of the Contract Documents.

B. Definitions

The requirements of this section relate primarily to customized fabrication and installation procedures, not to the production of standard products. Quality control services include inspections and tests and related actions including reports performed by independent agencies and governing authorities, as well as directly by the Contractor. These services do not include Contract enforcement activities performed directly by the Architect or Engineer.

1. Specific quality control requirements for individual units of work are specified in the sections of these specifications that specify the individual element of the work. These requirements, including inspections and tests, cover both production of standard products and fabrication of customized work. These requirements also cover quality control of the installation procedures.

2. Inspection, tests and related actions specified in this section and elsewhere in the Contract Documents are not intended to limit the Contractor's own quality control procedures which facilitate overall compliance with requirements of the Contract Documents.

3. Requirements for the Contractor to provide quality control services as required by the Architect / Engineer, the Owner, governing authorities or other authorized entities are not limited by the provisions of this section.

1.3 Responsibilities

A. Testing

Owner shall employ and pay for testing services except where tests are specifically indicated as being the contractor's responsibility.

B. Re-Test Responsibilities

Where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance or related work with the requirements of the Contract Documents, then re-tests are the responsibility of the Contractor, regardless of whether the original test was the Contractor's responsibility. Re-testing of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original work.

C. Responsibility for Associated Services

The Contractor is required to cooperate with the independent agencies performing required inspections, tests and similar services. Provide such auxiliary services as are reasonably requested. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel. These auxiliary services include, but are not necessarily limited to, the following:

1. Providing access to the work.
2. Taking samples or assistance with taking samples.
3. Delivery of samples to test laboratories.
4. Security and protection of samples and test equipment at the project site.

D. Coordination

The Contractor and each independent agency engaged to perform inspections, tests and similar services for the project shall coordinate the sequence of their activities so as to accommodate required services with a minimum of delay in the progress of the work. In addition, the Contractor and each independent testing agency shall coordinate their work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections, tests, taking of samples and similar activities.

1.4 Quality Assurance

Qualification for Service Agencies: Except as otherwise indicated, engage inspection and test service agencies, including independent testing laboratories, which are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which are recognized in the industry as specialized in the types of inspections and tests to be performed.

1.5 Submittals

A. General

Refer to Division - 1 Section of "Submittals" for the general requirements on submittals. Submit a certified written report of each inspection, test or similar service, directly to the Architect / Engineer, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

B. Report Data

Written reports of each inspection, test or similar service shall include, but not be limited to, the following:

1. Name of testing agency or test laboratory.
2. Dates and locations of samples and tests or inspections.
3. Names of individuals making the inspection or test.
4. Designation of the work and test method.
5. Complete inspection or test data.
6. Test results.
7. Interpretations of test results.
8. Notation of significant ambient conditions at the time of sample-taking and testing.
9. Comments or professional opinion as to whether inspected or tested work complies with requirements of the Contract Documents.
10. Recommendations on re-testing, if applicable.

2.0 - PRODUCTS

Not applicable.

3.0 - EXECUTION

3.1 Repair and Protection

Upon completion of inspection, testing, sample-taking and similar services performed on the work, repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed finishes. Comply with the Contract Document requirements for "Cutting and Patching". Protect work exposed by or for quality control service activities and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION

1.0 - GENERAL

A. Summary: Shop drawings may be transmitted for approval by electronic format or by hard copies.

1. Digital Copies:

a. Shop drawing and product data submittals shall be transmitted to Architect's office in electronic (PDF) format via email at **submittals@lathanassociates.com**. Do not email or copy transmittals to Architect or engineer.

b. The intent of electronic submittals is to expedite the construction process by reducing paperwork and improving information flow.

c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.

d. After receiving approved digital submittals, **General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days.** Submittals are not considered complete until 2 copies have been received by the Architect. This may have a direct effect on pay requests or final payment.

e. The Architect will retain the two (2) hard copies of shop drawing submittals: one for project records, and one to be incorporated with Close-Out Documents for the Owner.

f. Prior to submitting electronic submittals, GC must sign electronic submittal agreement. Project will be either all electronic or all hard copy. We will not accept electronic submittals once we have begun with hard copies. A copy of this agreement is attached to this section.

DIGITAL file name shall include Architect Job No, Specification Section number and description. (e.g., 15-01, 06100 - Rough Carpentry). We will not accept files that are randomly named. (e.g. scan 1234 or from Xerox Copier, etc.) Digital submittals must still be stamped approved or approved as noted.

B. Submittal Procedures:

1. Coordinate submittals preparation with construction, fabrication, other submittals and activities that require sequential operations. Transmit in advance of construction operations to avoid delay.

2. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.

3. Processing: General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect no less than three (3) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with the sequence of construction, related specification divisions and finishes to be selected in comparison, engineers, consultants and owner's representatives. Allow no less than two (2) weeks for reprocessing.

NOTE: No extension of Contract Time and/or additional costs will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

4. Submittal Preparation: The following information must be included with each transmittal.
   a. Date
   b. Project name and architect's project number.
   c. Name of the General Contractor and contact within company.
   d. Subcontractor name.
   e. Supplier name.
   f. Description of item.
   g. Specification Section and name of that section.
   h. Name of the Manufacturer - Model / Style of Item.
   i. Only project specific items should be sent.

5. Transmittal Letter: Transmit samples, etc. with form that contains Architect's Job name and number, Specification Number, Product Name, Manufacturer name and Model number. On the form, record requests for data and deviations from requirements.

6. Contractors Action/Approval

   Include General Contractor's certification stamp that information has been checked and complies with requirements before submitting to architect. General Contractor's action stamp must include Approved or Approved as Noted.

   Information received without the contractor's stamp will be returned without any action taken by engineer or architect.

C. Submittal Schedule:

1. After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit at or before date of the Pre-Construction Conference.

2. Coordinate with a list of Subcontracts, Schedule of Values, List of Products and the Contractor's Construction Schedule.

3. Prepare the schedule in order by Section number. Provide the following information:

   a. Date for first submittal.
   b. Related Section number.
   c. Submittal category (Shop Drawings, Product Data or Samples).
   d. Name of the Subcontractor.
   e. Description of the Work covered.
   f. Date for the Architect's final approval.

D. Shop Drawings:

Submit newly prepared information drawn to scale. Indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Do not use Shop Drawings without an appropriate final stamp indicating action taken.
7. After receiving approved digital Shop Drawings, General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days. Submittals are not considered complete until 2 copies

have been received by the Architect. This may have a direct effect on pay requests or final payment.

ALL MANUFACTURED ITEMS THAT ARE STRUCTURAL IN NATURE SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF ALABAMA AND SUBMITTED FOR APPROVAL.

E. Product Data:

1. Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.
2. Include the following information:
   a. Manufacturer's printed recommendations.
   b. Compliance with trade association standards.
   c. Compliance with recognized testing agency standards.
   d. Application of testing agency labels and seals.
   e. Notation of dimensions verified by field measurement.
   f. Notation of coordination requirements.
3. Submittals:
   a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.
4. Distribution:
   a. Furnish copies to Installers, Subcontractors, Suppliers and others required for performance of construction activities.
   b. Do not use unmarked Product Data for construction.

F. Samples:

1. Submit samples as required/requested and for color/texture finish selections.
2. Include the following:
   a. Specification Section number and reference.
   b. Generic description of the Sample.
   c. Sample source.
   d. Product name or name of the Manufacturer.
   e. Compliance with recognized standards.
3. Refer to other Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar characteristics.
   a. Samples erected at site and not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.

G. Architect's Action:

1. Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with contract documents and specified characteristics is the Contractor's responsibility.

2. Action Stamp

a. The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.

b. Architect's Action Stamp will read as follows:

Reviewed by Lathan Associates Architects, P.C.
Date
Approved for Design as Noted Subject to Contractor Verifying Quantities and Dimensions

2.0 - PRODUCTS Not applicable.

3.0 - EXECUTION Not applicable.

END OF SECTION

ELECTRONIC SUBMITTAL REQUIREMENTS FOR
LATHAN ASSOCIATES ARCHITECTS, P.C.

1. Processing: General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect two (2) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with other engineers and consultants.

   NOTE: No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

2. Contractors Action / Approval
   Include General Contractor's electronic certification stamp that information has been checked by the General Contractor and complies with requirements of the Contract Documents before submitting to architect. General Contractor's action stamp must include **Approved** or **Approved as Noted**.

   Information received without the contractor's stamp will not be reviewed and no action will be taken by engineer or architect.

   DIGITAL file name shall include Architect Job No, Specification Section number and description. (e.g., 15-01, 06100 - Rough Carpentry). We will not accept files that are randomly named. (e.g. scan 1234 or from Xerox Copier, etc.)

3. Submittal Preparation:
   Include the following information on transmittal / email.
   a. Date
   b. Project Name and Architect's Project Number.
   c. Name of the General Contractor and Contact within company.
   d. Subcontractor/Supplier.

   Clearly state **Number** and title of appropriate Specification Section and **Description** of Item and if applicable

   a. Name of the Manufacturer.
   b. Model / Style of Item.

4. **Electronic submittals will only be accepted when emailed to: submittals@lathanassociates.com**

   DO NOT COPY ARCHITECTS OR ENGINEERS WITH THE SUBMITTAL

5. After receiving approved submittals, **General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days.** Submittals are not considered complete until these copies are received by the Architect and may have a direct effect on Pay Requests and / or final payment.

I have read the above requirements and agree to the terms set forth in this document.

_____ by:_____
General Contractor Authorized Signature

_____
Architect Job Name and Number

1.0 GENERAL

1.1 Section Includes:
- A. General requirements for product options and substitution procedures.
- B. Material and product options.
- C. Substitutions.
- D. Coordination
- E. Substitution Request Form.

1.2 Related Sections:
- A. Section 01025 - Summary of Work
- B. Section 01040 - Project Coordination
- C. Section 01350 - Shop Drawing Submittals
- D. Section 01400 - Materials and Equipment
- E. Section 01900 - Warranties
- F. Section 01910 - Close Out Procedures
- G. In addition to “General Conditions of the Contract", comply with product option and substitution requirements specified in this Section.

1.3 Material and Product Options:
- A. Materials and products specified by reference standards, by performance, or by description only:
  1. Any product meeting specified requirements.
- B. Materials and products specified by naming products of one or more manufacturers with a provision for an equivalent product:
  1. Submit one of the products listed which complies with specified requirements or submit a Request for Substitution for a product of manufacturer not specifically named which complies with specified requirements.
- C. Materials and products specified by naming products of several manufacturers meeting specifications:
  1. Submit one of the products listed which complies with specified requirements or submit a Request for Substitution for a product of manufacturer not specifically named which complies with specified requirements.

1.4 Substitutions:
- A. After date of Notice to Proceed, Architect / Engineer will consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a material or product becomes unavailable due to no fault of Contractor or as follows:
  1. Lockouts
  2. Strikes
  3. Bankruptcy
  4. Discontinuation of products
  5. Proven shortage
  6. Other similar occurrences
- B. Each proposed substitution of materials or products for that one specified is a representation by Contractor that he has personally investigated the substitution and determined that the proposed substitution is equivalent or superior to that specified in quality, durability and serviceability, design, appearance, function, finish, performance, and of size and weight which will permit installation in spaces provided and allow adequate service access. Additionally, Contractor agrees that it will provide and/or do the following:

1. Same warranty on substitution as for specified product or materials;
2. Coordinate installation and make other changes that may be required for Work to be complete in all respects;
3. Waive claims for additional costs which may subsequently become apparent;
4. Verify that proposed materials and products comply with applicable building codes and governing regulations and, where applicable, has approval of governing authorities having jurisdiction.

C. The Architect/Engineer will review requests from Contractor for substitutions with the Owner. Contractor shall not purchase or install substitute materials and products without written approval. The Architect/Engineer will give written notice to Contractor and the Owner of acceptance or rejection within a reasonable time.

D. Document each request for substitution with complete data substantiating compliance of proposed substitution with Contract Documents. Contractor shall use the *Substitution Request Form* along with appropriate attachments and submit them to the office of the Architect. A copy of the *Substitution Request Form* is included at the end of this Section.
   1. Documents, as appropriate, shall include the following:
      a. Reason for the proposed substitution;
      b. Change in Contract Sum and Contract Time, if any;
      c. Effect on work progress schedule and completion date;
      d. Changes in details and construction of related work required due to substitution
      e. Drawings and samples
      f. Product identification and description
      g. Performance and test data
      h. Itemized comparison of the qualities of the proposed substitution to the product specified including durability, serviceability, design, appearance, function, finish, performance, size and space limitations, vibration, noise, and weight
      i. Availability of maintenance service, source and interchangeability of parts or components
      j. Additional information as requested.

E. In the event of credit change in the cost, the Owner shall receive all benefit of the reduction in cost of the proposed substitution. Credit shall be established prior to final approval of the proposed substitution and will be adjusted by Change Order.

F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, without having been reviewed and approved by Contractor, or when acceptance will require substantial revision of Contract Documents without addition compensation to the Architect / Engineer.

G. In the event that the Contractor or Subcontractor has neglected to place an order for specified materials and products to meet the work progress schedule, specified requirements, color schemes or other similar provisions, such failure or neglect shall not be considered as legitimate grounds for an extension of completion time nor shall arbitrary substitutions be considered to meet completion date.

H. Only one request for substitutions will be considered for each product. When substitutions are not accepted, the Contractor shall provide specified product.

I. Should substitution be accepted, and substitution subsequently is defective or otherwise unsatisfactory, Contractor shall replace defective material or product with specified material or product at no cost to Owner.

1.5 Coordination:

A. When a specified, optional, specified by reference standard, or proposed substitution item of equipment or material is submitted which requires minor changes or additions to the designed structure, finishes or to mechanical and/or electrical services due to its requirements being different from those shown on the Contract Documents, itemize the changes required and attach to submittal. Do not proceed with changes without written approval from the Architect / Engineer.

B. Contractor shall make adjustments and changes required to coordinate Work for installation of optional materials and products, approved substitutions and materials and products specified by reference standards without additional costs to Owner or Architect/ Engineer.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

PRIOR APPROVAL / SUBSTITUTION REQUEST FORM

Date: _____

Company Submitting Request: _____
(Name and Address)

_____

Contact Name: _____ **Phone:** _____ **Fax:** _____

E-Mail: _____

PROJECT NAME: _____

SPECIFIED ITEM: _____
(Section) (Page) (Description)

The undersigned requests consideration of the following product substitution:

PROPOSED SUBSTITUTION: _____
Provide Product Name / Model /Manufacturer

1. Attached data includes: _____ Product Description _____ Performance and Test Data
   _____ Drawings _____ Specifications _____ Photographs

2. _____ Yes / No changes will be required to the Contract Documents for the proper installation of proposed product substitution. If yes, then attach data that includes description of changes.

The undersigned states that the following paragraphs, unless modified by attachments, are correct:

1. The proposed substitution does not affect dimensions shown on the drawings.

2. No changes to the building design, engineering design, or detailing are required by the proposed substitution.

3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or **specified warranty requirements.**

4. No maintenance is required by the proposed substitution other than that required for originally specified product.

5. Other Information

The undersigned further states that they have read the corresponding specification section in the project manual and confirms that the function, appearance and quality of the proposed substitution are equivalent or superior to the originally specified product._____initial.

Signature: _____ Printed Name: _____

Fax Number: _____

For Architect's Use:

____ Accepted ____ Accepted As Noted ____ Incomplete Information

____ Not Accepted ____ Received Too Late ____ No Substitutions Accepted For This Product

Reviewed By / Date: _____

Processed by Addendum No. _____

Comments: _____

_____

1.0 - GENERAL REQUIREMENTS

1.1 Products and Materials

A. Products, materials and manufactured items or articles of like nature shall, as nearly as possible, be of one brand or manufacturer. No changes or substitutions shall be made without written consent of the Architect. In selection of colors and patterns, the Architect reserves the right to select from the manufacturer's running pattern line (within same price range) of the materials called for in the Specifications without the added cost to the Owner.

B. All products and materials used for this project shall be asbestos free.

1.2 Trade Names

The use of manufacturer's names and serial numbers are given to establish a standard of manufacture and not intended to be restrictive or preferential. Similar, equal, and approved materials of other manufacturers will be acceptable, subject to the approval of the Architect, pursuant to requirements set forth in INSTRUCTIONS TO BIDDERS and as required by the Specifications.

1.3 Measurements

Before ordering any material or doing any work, the Contractor shall verify all measurements of the building and shall be responsible for correctness of same. No extra charge or compensation will be allowed because of differences between actual measurements and the dimensions indicated on the Drawings. Any differences which may be found, shall be submitted to the Architect for consideration before proceeding with the work.

1.4 Salvageable Material

Any salvageable material and/or equipment shall remain the property of the Owner and, upon removal from its existing location, shall be stored where directed by the Architect.

In the event that the Owner does not wish to keep the salvaged material, it shall be the responsibility of the Contractor to remove same promptly from the site.

Salvageable material shall include those items indicated on the drawings as items to be reused or relocated. Remove all finish hardware from doors noted to be removed under demolition. Tag and label finish hardware as to door function (and label), and turn over to Owner.

Coordinate with Architect on questionable salvage items.

1.5 Unused Materials

Unused excess materials purchased for this project and charged against the contract shall be the property of the General Contractor and removed upon final completion.

END OF SECTION

SECTION 01410 – QA/ QC, STRUCTURAL TESTS, AND STRUCTURAL SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements required for compliance with the International Building Code, Chapter 17, Structural Tests and Special Inspections as well as specific quality-assurance and -control requirements for individual construction activities as referenced in the Sections that specify those activities.

B. Structural testing and special inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve contractor of responsibility for compliance with other construction document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the construction document requirements.
2. 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. The owner will engage one or more qualified special inspectors and / or testing agencies to conduct structural tests and special inspections specified in this section and related sections and as maybe specified in other divisions of these specifications.

1.3 DEFINITIONS

A. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official and the Structural Engineer of Record.

B. Construction Documents: Written (including specifications), graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction Documents include all supplemental instructions, sketches, addenda, and revisions to the drawings and specifications issued by the registered design professional beyond those issued for a building permit.

C. Shop Drawings / Submittal Data: Written, graphic and pictorial documents prepared and / or assembled by the contractor based on the Construction Documents.

D. Structural Observation: Visual observation of the structural system by a representative of the registered design professional’s office for general conformance to the approved construction

documents. Structural observations are not considered part of the structural tests and special inspections and do not replace inspections and testing by the testing agency or special inspector.

D. Special Inspector: A qualified person who demonstrating competence, to the satisfaction of the code enforcement official and registered design professional in responsible charge, for inspection of the particular type of construction or operation requiring special inspection. The special inspector shall be a licensed professional engineer or engineering intern or a qualified representative from the testing agency.

E. Special Inspection, Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

F. Special Inspection, Periodic: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

G. Testing Agency: A qualified materials testing laboratory under the responsible charge of a licensed professional engineer, approved by the code enforcement official and the registered design professional in responsible charge, to measure, examine, test, calibrate, or otherwise determine the characteristics or performance of construction materials and verify confirmation with construction documents.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Minimum qualifications of inspection and testing agencies and their personnel shall comply with ASTM E329-03 Standard Specification for Agencies in the Testing and / or Inspection of Materials Used in Construction.
      a. Inspectors and individuals performing tests shall be certified for the work being performed as outlined in the appendix of the ASTM E329. Certification by organizations other than those listed must be submitted to the building official for consideration before proceeding with work.

   2. Additional minimum qualifications of inspection and testing agencies and their personnel inspecting and testing concrete and concrete related work shall be as follows:
      a. An independent agency, acceptable to the Structural Engineer of Record qualified according to ASTM C 1077.
      b. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
      c. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

   3. In addition to these requirements, local jurisdiction may have additional requirements. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.

1.5 CONFLICTING REQUIREMENTS, REPORTS, AND TEST RESULTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most

stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the registered design professional in responsible charge for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the registered design profession in responsible charge for a decision before proceeding.

C. The special inspector's reports and testing agencies results shall have precedence over reports and test results provided by the contractor.

D. Where a conflict exists between the construction documents and approved shop drawings / submittal data, the construction documents shall govern unless the shop drawings / submittal data are more restrictive. All conflicts shall be brought to the attention of the registered design professional in responsible charge.

1.6 SUBMITTALS BY SPECIAL INSPECTOR AND / OR TESTING AGENCY

A. Special inspectors shall keep and distribute records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge, contractor, architect, and owner. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon by the permit applicant and the building official prior to the start of work.
    1. Special inspection reports and test results shall include, but not be limited to, the following:
        a. Date of inspection.
        b. Description of inspections or tests performed including location (reference grid lines, floors, elevations, etc.).
        c. Statement noting that the work, material, and / or product conforms or does not conform to the construction document requirements.
            1) Name and signature of contractor's representative who was notified of work, material, and / or products that do not meet the construction document requirements.
        d. Name and signature of special inspector and / or testing agency representative performing the work.
        e. Additional information as required herein.

B. Schedule of Non-Compliant Work: Each agent shall maintain a log of work that does not meet the requirements of the construction documents. Include reference to original inspection / test report and subsequent dates of re-inspection / retesting.

C. Reports and tests shall be submitted within 1 week of inspection or test. Schedule of Non-Compliant Work shall be updated daily and submitted at monthly intervals.

D. Concrete Test Reports: Test results shall be reported in writing to Architect, Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests

shall contain:

1. Project identification name and number.
2. Date and time of concrete placement.
3. Mix design number or identification.
4. Design compressive strength at 28 days.
5. Design Air Content.
6. Design Slump.
7. Location of concrete batch in Work.
8. Time concrete was batched.
9. Amount of water withheld at plant.
10. Amount of water added at site.
11. Temperature of mix at point of placement.
12. Slump at point of placement

    a. When use of a Type I or II plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C494 is used, slump shall be measured and report both before addition of the admixture and at the point of placement.

13. Air content.
14. Name of concrete testing and inspecting agency.
    a. Name of Laboratory Technician and ACI Certification Number.
    b. Name of Field Technician and ACI Certification Number.
15. Compressive breaking strength.
16. Type of break.

E. Final Report of Special Inspections. Submitted by each agent listed in the schedule of Structural Testing and Special Inspections.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITY

A. The contractor shall coordinate the inspection and testing services with the progress of the work. The contractor shall provide sufficient notice to allow proper scheduling of all personnel. The contractor shall provide safe access for performing inspection and on site testing.

B. The contractor shall submit schedules to the owner, registered design professionals and testing and inspecting agencies. Schedules will note milestones and durations of time for materials requiring structural tests and special inspections.

C. The contractor shall repair and / or replace work that does not meet the requirements of the construction documents.

a. Contractor shall engage an engineer / architect to prepare repair and / or replacement procedures.
b. Engineer / architect shall be registered in the state in which the project is located. Engineer shall be acceptable to the registered design professional in responsible charge, code enforcement official, and owner.
c. Procedures shall be submitted for review and acceptance by the registered design professional in responsible charge, code enforcement official, and owner before proceeding with corrective action.

D. The contractor shall be responsible for costs of:
a. Re-testing and re-inspection of materials, work, and / or products that do not meet the requirements of the construction documents and shop drawings / submittal data.
b. Review of proposed repair and / or replacement procedures by the registered design professional in responsible charge and the inspectors and testing agencies.
c. Repair or replacement of work that does not meet the requirements of the construction documents.

3.2 STRUCTURAL OBSERVATIONS

A. Structural observations may be made periodically as determined by the registered design professional in responsible charge.

3.3 TESTING AND INSPECTION

A. Testing and inspection shall be in accordance with the attached Schedule of Special Inspections, as listed elsewhere in the project documents, and as listed herein.

B. Inspection of Fabricator’s QC procedures

1. Review the quality control procedures of the following fabricators for completeness and adequacy relative to the fabricator's scope of work: steel fabricator AND metal truss fabricators.

i. Exception: AISC Certified Steel Fabricators that submit a “Certificate of Compliance” at completion of their scope of work.

C. Soils, Periodic Inspection.

1. Verify bearing capacities of soils beneath footings is in accordance with the approved project soils report and earthwork specifications.

2. Verify assumed bearing capacities (As noted on the drawings, recommended by the geotechnical engineer, and specified in earthwork specifications.) and determine settlements of soils beneath footings and building pad.

3. Verify site preparation prior to beginning fill placement. Verify fill material type, placement method, lift thickness, and compaction of fill material. Verify in-place density of compacted fill.

i. As recommended in approved soils report and specified in earthwork specifications.

D. Concrete, Continuous Inspection

1. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

    i. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd, but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    ii. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

    i. Unit Weight is only required for lightweight concrete

6. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimens at 7 days, one set of two specimens at 28 days, and hold one in reserve for later testing as directed by the Structural Engineer of Record.

    i. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

7. Inspect bolts to be installed prior to and during placement of concrete.

8. Inspect concrete placement to verify operations are in accordance with project requirements.

    i. Verify correct mix is used.

E. Concrete, Periodic Inspection

1. Floor flatness:

    i. Measure floor and slab flatness and levelness according to ASTM E 1155 within **24** hours of finishing..

2. Inspect concrete formwork prior to concrete placemen, except as noted. Verify that construction joints are properly keyed. Verify that slab recesses, if any, have been installed.

3. Inspect reinforcing steel prior to concrete placement, except as noted, for installation including size, spacing and bar clearances. Verify that lap splices and embedment lengths

are per the construction documents. Verify that dowels for work above are properly aligned and spaced to match other work.

4. Inspect all concrete curing operations and verify they are in accordance with project requirements.

F. Masonry, Periodic Inspection

1. At beginning of masonry construction:

    i. Inspect proportions of site prepared mortar and grout.

    ii. Inspect construction of mortar joints.

    iii. Inspect reinforcement for correct size and spacing.

2. At beginning of masonry construction and every 1000 square feet of masonry thereafter

    i. Inspect work for size and location of structural elements

    ii. Inspect work for correct location and type of embeds and anchor bolts.

    iii. Specified size, grade, and type of reinforcement.

3. Prior to grouting

    i. Inspect masonry cells and cleanouts prior to placement of grout. Verify spaces are clear.

    ii. Inspect any site prepared grout proportions.

    iii. Inspect placement of reinforcement.

    iv. Inspect construction of mortar joints

4. Inspect protection of masonry during cold weather and hot weather.

    i. During periods with temperatures below 40 degrees or above 90 degrees.

5. Verify compliance with all required inspection provisions of the construction documents and approved submittals.

G. Steel Construction, Periodic Inspection

1. Inspect high-strength bolts, nuts and washers:

    i. Identify markings to conform to ASTM standards specified in the construction document.

    ii. Inspect manufacturer’s certificate of compliance.

2. Inspect high-strength bolting: Bearing-type connections.

3. Inspect and verify structural steel material:

i. Identification markings to conform to ASTM standards specified in the approved construction documents.

ii. Manufacturers' certified mill test reports.

4. Inspect and verify weld filler materials:

i. Identification markings to conform to AWS specification in the approved construction documents.

ii. Manufacturer's certificate of compliance required

5. Inspect welding: Structural Steel:

i. Single-pass fillet welds ≤ 5/16

ii. Metal roof deck connections.

H. Trusses, Periodic Inspection

1. Inspect metal roof trusses and shop built components.

i. Inspect truss production in shop unless fabricator is approved by building official and submits certification of compliance at end of scope of work. Inspect 10% of trusses. Inspect 100% of trusses if discrepancies are observed.

2. Inspect site-built assemblies including site built trusses. Inspect erected trusses including bridging and attachments.

i. Inspect all site-built trusses. Inspect erected trusses and installation of bridging.

3. Inspect connection of truss elements including number of screws and attachment of connections of individual truss components.

4. Inspect truss to truss connections and truss to structure connections.

5. Inspect high-load diaphragms.

i. Inspect all diaphragms after installation is complete.

6. Inspect restraint/bracing.

i. For trusses spanning greater than 60ft, verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

I. Special Inspection for Wind Resistance, Periodic Inspection

1. Roof Cladding and Roof Framing Connections.

2. Wall Connections to Roof.

3. Diaphragms connections to framing.

J. Reference related specifications for the minimum level of inspections and testing. Provide

additional inspections and testing as necessary to determine compliance with the construction drawings.

PART 4 - SCHEDULES AND FORMS (ATTACHED)

Statement of Special Inspections

Project: *New Gymnasium Addition to Montevallo High School*

Location: *980 Oak Street, Montevallo. AL. 35115*

Owner: *Shelby County Board of Education*

Design Professional in Responsible Charge:

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing

☐ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *Weekly* or ☐ per attached schedule.

Prepared by:

_____
(type or print name)

_____ _____
Signature Date

Design Professional Seal

Owner's Authorization:

_____ _____
Signature Date

Building Official's Acceptance:

_____ _____
Signature Date

Final Report of Special Inspections

Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

(Type or print name)

Signature Date

Licensed Professional Seal

Agent's Final Report

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Agent of the Special Inspector

(Type or print name)

Signature Date

Licensed Professional Seal or Certification

Contractor's Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated in the Quality Assurance Plan must submit a Statement of Responsibility.

Project:

Contractor's Name:

Address:

License No.:

Description of designated building systems and components included in the Statement of Responsibility:

Contractor's Acknowledgment of Special Requirements

I hereby acknowledge that I have received, read, and understand the Quality Assurance Plan and Special Inspection program.

I hereby acknowledge that control will be exercised to obtain conformance with the construction documents approved by the Building Official.

_____ _____

Signature Date

Contractor's Provisions for Quality Control

Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of reports is attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement.

Fabricator's Certificate of Compliance

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project:

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the approved construction documents.

_____ _____
Signature Date

_____
Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual

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SCHEDULE OF SPECIAL INSPECTIONS

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
1.00	**Fabricators**			
1.01	Review the quality control procedures of the following fabricators for completeness and adequacy relative to the fabricator's scope of work: steel fabricator, lightgage truss fabricator, wood truss fabricator.	Periodic		OTA
1.02	The following fabricators, if registered and approved by the building official, may submit "Certificates of Compliance" at the completion of their scope of work that their fabricated items were constructed in accordance with the approved construction documents: steel fabricator, lightgage truss fabricator, wood truss fabricator.	Periodic		OTA
2.00	**Soils and Deep Foundations**			
2.01	Verify bearing capacities of soils beneath footings.	Periodic	As recommended in approved soils report and specified in earthwork specifications.	OTA
2.02	Verify site preparation prior to beginning fill placement. Verify fill material type, placement method, lift thickness, and compaction of fill material. Verify in-place density of compacted fill.	Periodic	As recommended in approved soils report and specified in earthwork specifications.	OTA
3.00	**Concrete Construction**			
3.01	Spread footings are excepted from the inspections listed below.			OTA
3.02	Continuous footings are excepted from the inspections listed below.			OTA
3.03	Slabs on grade are excepted from the inspections listed below.			OTA
3.04	Inspect reinforcing steel except as noted above for installation including size, spacing and bar clearances. Verify that lap splices and embedment lengths are per the construction documents. Verify that dowels for work above are properly aligned and spaced to match other work.	Periodic	Prior to each pour.	OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
3.05	Inspect bolts	Periodic		OTA
3.06	Verify each proposed concrete mix for the project.	Periodic	For each proposed mix.	OTA
3.07	Sample all concrete for strength tests and test concrete for slump, air content, temperature, and other tests.	Continuous	During placement operations. Reference concrete specifications for specific tests and frequencies.	OTA
3.08	Inspect concrete placement except as noted above.	Continuous		OTA
3.09	Inspect all concrete curing operations as noted in the extents column.	Periodic	Monitor during hot, cold and windy conditions. Reference concrete specifications.	OTA
3.10	Erection of precast concrete members.	Periodic	Inspect all connections.	OTA
3.11	Inspect Post installed anchors, expansion	Periodic		OTA
3.12	Inspect Post installed anchors, epoxy anchors	Continuous		OTA
4.00	**Masonry Construction**			
4.01	Masonry foundation walls are excluded from inspections listed below.			OTA
4.02	Inspect proportions of site prepared mortar and grout. Inspect construction of mortar joints. Inspect reinforcement for correct size and spacing. Inspect work for correct location and type of embeds and anchor bolts. Inspect work for size and location of structural elements.	Periodic	At beginning of masonry construction and every 1000 square feet of masonry thereafter.	OTA
4.03	Inspect masonry cells and cleanouts prior to placement of grout. Inspect grout proportions. Inspect placement of reinforcement.	Periodic	Prior to grouting of masonry.	OTA
4.04	Inspect grouting operations to ensure compliance with code and construction documents.	Continuous	During grouting.	OTA
4.05	Inspect proportions of site prepared mortar and grout. Inspect placement of masonry units and construction of mortar joints. Inspect reinforcement for correct size and spacing. Inspect work for correct size and location of structural elements.	Periodic	At beginning of masonry construction and every 1000 square feet of masonry thereafter.	OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
4.06	Inspect masonry cells and cleanouts prior to placement of grout. Inspect placement of all grout.	Continuous	During grouting.	OTA
4.07	Inspect type size and location of anchors, including details of anchorage of masonry to structural members, frames or other construction.	Continuous	During installation of anchors.	OTA
4.08	Inspect protection of masonry during cold weather and hot weather.	Periodic	During periods with temperatures below 40 degrees or above 90 degrees.	OTA
4.09	Inspect preparation of grout specimens, mortar specimens and / or prisms.	Continuous	During preparation of all specimens.	OTA
4.10	Verify compliance with all required inspection provisions of the construction documents and approved submittals.	Periodic	As required for duration of project.	OTA
5.00	**Steel Construction**			
5.01	Inspect high-strength bolts, nuts and washers: a. Identify markings to conform to ASTM standards specified in the construction documents. b. Inspect manufacturer's certificate of compliance.	Periodic	Reference project specifications and ASTM material specifications; AISC 335, (Sect A3.4); AISC LRFD (Sect A3.3).	OTA
5.02	Inspect high-strength bolting: Bearing-type connections.	Periodic		OTA
5.03	Inspect high-strength bolting: Slip-critical connections.	Periodic or Continuous	Continuous monitoring required for pretensioning using calibrated wrench method or turn-of-nut method without matchmarking.	OTA
5.04	Inspect and verify structural steel material: a. Identification markings to conform to ASTM standards specified in the approved construction documents. b. Manufacturers' certified mill test reports.	Periodic	Confirm that materials meet applicable ASTM specifications noted in construction documents.	OTA
5.05	Inspect and verify weld filler materials: a. Identification markings to conform to AWS specification in the approved construction documents. b. Manufacturer's certificate of compliance required.	Periodic	Confirm that materials meet applicable ASTM specifications noted in construction documents.	OTA
5.06	Inspect welding: Structural Steel: 1) Complete and partial penetration groove 2) Multipass fillet welds. 3) Single-pass fillet welds > 5/16 ″	Continuous	Per specifications and AWS D1.1	OTA
5.07	Inspect welding: Structural Steel: 1) Single-pass fillet welds ≤ 5/16 ″ 2) Floor and deck welds.	Periodic	Per specifications and AWS D1.1	OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
5.08	6. Inspect steel frame joint details for compliance with approved construction documents: a. Details such as bracing and stiffening. b. Member locations. c. Application of joint details at each connection.	Periodic	Inspect complete frame.	OTA
6.00	**Special Inspections for Wind Resistance**			
6.01	Roof Cladding and Roof Framing Connections	Periodic		OTA
6.02	Wall Connections to Roof and Floor Diaphragms and Framing	Periodic		OTA
6.03	Roof and Floor Diaphragm Systems, including Collectors, Drag Struts, and Boundary Elements.	Periodic		OTA
6.04	Vertical Windforce-Resisting Systems, including Braced Frames, Moment Frames, and Shearwalls	Periodic		OTA
6.05	Windforce-Resisting System Connections to the Foundation.	Periodic		OTA
6.06	Fabrication and installation of components and assemblies required to meet the impact-resistance requirements of Section 1609.1.4.	Periodic		OTA
7.00	**Special Inspections for Seismic Resistance**			
7.01	Inspect structural welding in accordance with AISC 341.	Continuous	Exceptions: 1. Single-pass fillet welds not exceeding 5/16 inch in size. 2. Floor and roof deck welding.	OTA
7.02	Inspect nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system including drag-struts, braces and hold-downs.	Periodic		OTA
7.03	Inspect welding operations of cold-formed steel framing elements of the seismic-force-resisting system.	Periodic		OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
7.04	Inspect screw attachment, bolting, anchoring and other fastening of cold-formed steel framing components within the seismic-force-resisting system.	Periodic		OTA
7.05	Certificates of compliance used in masonry construction		Prior to construction.	OTA
7.06	Verify masonry *f'm.*		Prior to construction.	OTA
7.07	Test masonry *f'm.*	Periodic	Test for each 5000 sf of masonry.	OTA
7.08	Verification of proportions of materials in mortar and grout as delivered to the site	Periodic		OTA
7.09	Review certified mill test reports of all concrete reinforcing.			OTA
7.10	Submit certificate of compliance for designated seismic system components			OTA
8.00	**Cold Formed Steel Framing Construction**			
8.01	Inspect exterior wall infill including installed studs' sizes and attachments.	Periodic		OTA
8.02	Inspect roof trusses assembly/framing and attachments.	Periodic		OTA
8.03	Verify size and gage of load bearing studs.	Periodic		OTA
8.04	Verify load bearing framing spacing, configuration and attachments.	Periodic		OTA
8.05	Verify load bearing bracing and blocking	Periodic		OTA
8.06	Proper seating of studs in track.	Periodic		OTA
8.07	Stud header size, gauge, and construction per structural drawings for load bearing walls.	Periodic		OTA
8.08	Screw attachments, bolting, anchoring, and other fastening of components per structural drawings.	Periodic		OTA
8.09	Welding of elements per structural drawings.	Periodic		OTA
8.10	Where a cold-formed steel truss clear span is 60 feet or greater, verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.	Periodic		OTA

INSPECTION AGENTS

#	Firm, Address, Telephone
OTA	Owner's Testing Agent
SDG	SDG -- 300 Chase Park South, Suite 125, Hoover, AL 35244 -- (205) 824 - 5200

Note: The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Inspection Agent(s)

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
may be subject to the approval of the Building Official. Is the Schedule of Special Inspection Services part of a Quality Assurance Plan as defined in Sections 1705 or 1706 of the Building Code? _____				

1.0 - GENERAL

1.1 Related Documents

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division - 1 Specifications Sections, apply to work of this Section. See drawings for additional Demolition and Protection Requirements not stated herein.

1.2 Description of Work

A. Extent of selective demolition work as indicated on drawings and/or as required for completion of finish work.

B. Types of Selective Demolition Work: Demolition requires the selective removal and subsequent offsite disposal of the following:

1. It is the intent for all required existing building components, systems, related structure, materials, etc., be removed and/or relocated to allow for completion of new construction, whether indicated or not.

2. All abandoned components, systems and related wiring, piping, ductwork, controls, fixtures, etc., shall be removed from job site, whether specifically indicated or not. Refer to Civil, Structural, Plumbing, Mechanical and Electrical drawings and specifications for respective demolition requirements and coordinate with Architectural.

3. See drawings for other demolition items.

1.3 Submittals

A. Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

B. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

C. Existing building function and operation shall be maintained during construction unless scheduled and approved by the Owner. Work schedule shall vary as required to complete work as required.

D. Existing facilities shall be maintained in operation during construction. Protect and/or relocate all utilities, service, security systems, satellite communications, data systems, etc., as required to ensure continuous operation and function. Temporary relocation and utility outages shall be scheduled and approved by the Owner.

1.4 Job Conditions

A. Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact Owner's normal operations.

B. Owner and Architect assume no responsibility for actual condition of items or structures to be demolished.

C. All salvageable materials, as selected by Owner, shall be removed, stored, and / or delivered to Owner as directed. Salvageable materials shall be protected during removal and delivery. All items of salvage not wanted by the Owner shall be the property of the General Contractor and removed from job site.

D. Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

1. All paths to and from exits and entrances shall be maintained during construction. Provide temporary barricades, fences, warning signs, etc., as required, interior and exterior, to protect building occupants and pedestrians during construction and demolition.

2. Erect temporary covered passageways as required by authorities having jurisdiction.

3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

5. Protect floors with suitable coverings when necessary.

6. Construct temporary insulated solid dust proof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.

7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

8. Remove protections at completion of work.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

F. Traffic:

1. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.

2. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Explosives: Use of explosives will not be permitted.

H. Utility Services:

1. Maintain existing utilities indicated to remain, keep in service and protect against damage during demolition operations.

2. Do not interrupt existing utilities or fire alarm/fire protection systems serving occupied or used facilities, except when authorized in writing by

authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities. Repair damages to such immediately.

I. Environmental Controls:

1. Use water sprinkling, temporary enclosures and other suitable methods to limit dust and dirt, interior and exterior, from rising and scattering in air to lowest practical level. **COMPLY WITH GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION.**

2. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding and pollution.

2.0 - PRODUCTS

Products are not applicable to this section.

3.0 - EXECUTION

3.1 Inspection

Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions of structure surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's representative prior to starting work.

3.2 Preparation

A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

B. Cease operations and notify the Owner’s representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

C. Cover, protect, and relocate furniture, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

D. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

E. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4" studs, 5/8" drywall (joints taped) on occupied side, 1/2" fire-retardant plywood on demolition side, and fill partition cavity with sound-deadening insulation.

F. Provide weatherproof closures for exterior openings resulting from demolition work.

G. Locate, identify, stub off and disconnect utility services that are not indicated to remain.

H. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change over.

3.3 Demolition

A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.

1. Demolish concrete and masonry in all sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, roofs or framing.

3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

4. For interior slab on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

5. Existing ceramic tile floor finishes shall be removed down to the top of the existing dropped slab.

B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.4 Disposal of Demolished Materials

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site. Pay all related fees and costs.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

C. Burning of removed materials is not permitted on project site.

3.5 Clean-Up and Repair

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

1.0 - GENERAL

1.1 Scope of Work

A. Demolition shall, unless otherwise noted, included removal of existing objects or improvements, whether indicated or not, that would in any way prevent or interfere with progress or completion of proposed.

B. Permits, fees and licenses shall be secured and paid for by Contractor, including disposal charges as required to ensure progress of work will proceed.

C. Work shall comply with the latest edition of city ordinance or regulations and/or requirements of any governing authorities or utility owners in demolition of existing pavement, curbs and gutters, drainage structures and utilities as may be required.

D. Demolition requires removal and disposal off-site in a legal manner of the following:

1. All demolished carpet, carpet glue or anything related to carpet system.

2. All demolished wallcovering, glue or anything related to wallcovering system.

3. Wood base and shoe mould that is required to be removed for proper vinyl wallcovering and carpet installation. Any wood base and shoe mould that is damaged during demolition shall be removed and disposed.

1.2 Job Conditions

A. Occupancy: Areas to be demolished will remain in use for duration of work.

B. Condition of Structures:

1. Owner assumes no responsibility for actual condition of materials to be demolished.

2. Conditions existing at time of the inspection for bidding purposes will be maintained by Owner insofar as practicable. Variations within structures may occur by Owner’s removal and salvage prior to start of demolition work.

C. Partial Removal:

1. Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.

2. Storage or sale of removed items on site will not be permitted.

D. Protections:
Ensure safe passage of persons around areas of demolition. Conduct operations to prevent damage to adjacent buildings, structures, other facilities and injury to persons.

E. Damages:
Promptly repair damages caused to adjacent facilities, etc., by demolition operations at no cost to Owner.

2.0 PRODUCTS (Not Applicable)

3.0 - EXECUTION

3.1 Demolition

A. Pollution Controls

1. Use suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

2. Clean adjacent areas and improvements of dust, dirt and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

3. Protect all items remaining within building as required and clean all areas prior to final inspection.

B. Scaffolding, Barricades, Shoring, etc.

Scaffolding, barricades, shoring, etc. as required shall be provided by the Contractor in compliance with all recognized safety rules and prevailing laws, codes or ordinances applicable thereto. All such scaffolding, barricades, shoring, etc., shall remain until construction has been completed. The Contractor, upon completion, shall remove any and all scaffolding, barricades, shoring, etc., and leave site clean from debris and make ready for other construction or use.

C. Protection

1. Existing walks, curbs, drives, other improvements on or near the site that are to remain, shall be properly protected from damage of any kind by the Contractor during the entire construction operation. Improvements that are damaged shall be replaced to the satisfaction of the Architect at the Contractor's expense.

2. Provide all required protection as may be required by the governing governmental agencies for protection of the public on or near the site.

3.2 Disposal of Demolished Materials

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site. Pay all related fees and costs.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

3.3 Payment

Include all work in this section in lump sum.

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work required under this Section consists of providing all labor, materials and equipment necessary to do all clean-up work; including, but not limited to, periodic cleaning, removal of temporary protection, removal of debris and final cleaning.

1.2 Related Sections

Administrative provisions and technical requirements specified under this Section are in addition to provisions for cleaning specified under various Sections of the Specifications and apply to each Section of Specifications.

1.3 Special Instructions

A. Contractor shall endeavor to keep interior free of dust and mud, take precautionary measures, and provide protective materials, such as insulated dust and noise partitions and gravel at all entries during dried-in stages of construction.

B. Upon completion of work in each area or part of the building and immediately prior to final inspection and acceptance of that respective area, that area shall be thoroughly cleaned and made ready for immediate occupancy by the Owner.

C. In case of failure to comply with the requirements of this Section for any part of the work within the time specified by the Architect, the Architect may cause the work to be done and deduct the price thereof from the Contract Price on the next succeeding monthly Application for Payment.

2.0 - PRODUCTS

2.1 Equipment

A. For periodic and final cleaning operations, use approved apparatus designed for the specific type of cleaning required and compatible with the particular materials to be cleaned.

B. Operate equipment in compliance with equipment manufacturer’s instructions.

2.2 Materials

All soap, detergents, brushes, scrapers and other materials and accessories utilized in periodic and final cleaning shall be of a type recommended by the material manufacturer as being compatible with and non-injurious to the particular surface, material, equipment or finish to be cleaned.

3.0 - EXECUTION

3.1 Periodic Cleaning

A. The Contractor shall periodically, or as directed during the progress of the work, clean-up and remove from the premises all refuse, rubbish, scrap materials and debris caused by his employees, his Subcontractors or resulting from his work.

B. Such clean-up shall be sufficient to assure that at all times the premises are sanitary, safe, reasonably clean, orderly and workmanlike.

C. Remove oily rags and combustible waste, debris, rubbish and excess materials from the premises at the completion of each day’s work, or more often, if required to keep the building and premises free from any accumulation of flammable and dangerous materials.

D. At no time shall any rubbish, debris or any other material be thrown from window or door openings nor into foundation trenches.

E. Clean areas prior to any painting work. Take care to settle and minimize dust before painting begins. Use commercial type vacuum cleaners.

F. Close rooms and areas where painting and decorating work is completed to all but authorized personnel.

G. All debris and waste materials shall become the property of the Contractor and shall be removed by him from the project site.

H. Remove Debris from roof tops daily.

I. Trim excess exposed dur-o-wall flush with face of CMU.

J. Keep adjacent paved driveways and roads clear of mud and debris intruded as a result of this work.

3.2 Removal of Temporary Facilities

A. Upon completion of work in each area or part of the building, remove temporary lighting, power, protection and enclosures and repair defects in materials and workmanship noted after removal of such.

B. Before final completion and final acceptance, the Contractor shall remove from the Owner's property, and from all public and private property, all tools, scaffolding, falsework, temporary structures and/or utilities including the foundations thereof (except as the Owner permits in writing to remain).

3.3 Final Cleaning

A. Before final completion and acceptance, the Contractor shall remove from the Owner's property, and from all public and private property, all refuse, rubbish, scrap and surplus material and debris caused by his employees, his Subcontractors, or resulting from his work, leaving the site clean and true to line and grade, and the work in a safe and clean condition, ready for use and operation.

B. Clean all painted, enameled, stained or baked enamel work to remove all marks, stains, smudges, fingerprints and splatters from such surfaces.

C. Clean and remove all stickers, labels, marks, stains, smudges and paint from all glass. Wash and polish all glass, including, but not limited to, that in mirrors, view windows and doors, on the interior and exterior. Scratched or marred glass shall be replaced.

D. Clean all hardware and metals to remove all stains, marks, smudges, fingerprints, dirt, dust, paint or other disfigurement and polish. Scratched, marred or otherwise disfigured hardware or metals shall be replaced.

E. Clean all tile and floor finishes of all kinds to remove all splatters, stains, paint, dirt and dust. Wash and apply a final coat of wax and polish all finished floors except concrete and carpet as recommended by the manufacturer or as required by the Architect.

F. Clean all manufactured articles, fixtures, materials, appliances and equipment to remove all stickers, labels, rust stains and temporary covers.

G. Clean and condition all manufactured articles, fixtures, materials, appliances and equipment and all electrical, heating and air conditioning equipment as recommended or directed by the manufacturer.

H. Blow out or flush out all foreign matter from all dust pockets, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers and similar features of all appliances and equipment and all electrical, heating and air conditioning equipment as recommended or directed by the manufacturer.

I. Remove all paint from all identification plates on all appliances and equipment and all electrical, heating and air conditioning equipment and polish plates.

J. Exterior walks, steps, ramps and platforms shall be washed down, and broom cleaned to remove all dirt, dust, stains or other disfigurations.

K. Interior surfaces of all heating, ventilation and air conditioning ducts shall be damp or wet mopped or vacuum cleaned to remove all dirt and dust.

L. In general, leave all work clean and free of dirt, dust, smudges, stains, paint spots, mastic, caulk, sealant and other excess materials.

M. After final cleaning of building and prior to final balancing of heating and air conditioning system, all air filters shall be replaced with clean, new filters.

N. Upon completion of final cleaning, remove all cleaning equipment, materials and debris from the building and the premises.

END OF SECTION

1.0 - GENERAL

A. This Section shall adhere to *General Conditions of the Contract, Article 19, and DCM Form C-12,* as issued by The State of Alabama Department of Construction Management, a copy of which is included within this Specification Manual.

B. Should changes in the work constitute an increase or decrease in the Contract amount, the General Contractor shall submit a Change Order Request (COR) which shall include a number for identification, description and cost break down.

C. Contractor shall attach all supporting documentation, including, but not limited to the following:
   1. Breakdown of costs which shall include material, labor, delivery (freight), installation, taxes, and mark-up for overhead and profit.

   2. If a Subcontractor is used for the requested change, then supporting documentation listed for Item 1 shall also be provided by the Subcontractor and included with the COR.

D. In accordance with *General Conditions of the Contract, Article 19,* the General Contractor shall note the following:
   1. Mark-Up Procedures for Change Order with net addition to Contract:
      a. The General Contractor's mark-up for overhead and profit shall not exceed fifteen (15) percent.
      b. Where Subcontract work is involved, the total mark-up for the Contractor and Subcontractor shall not exceed twenty-five (25) percent.
      c. The Architect must be able to determine the total amount of mark-up, therefore, supporting documentation **must** state the mark-up of both the Subcontractor and the General Contractor.

   2. Mark-Up Procedures for Change Order with net Credit to Contract:
      "General Conditions of the Contract":
      Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work of no less than 5%.

   3. Overhead "Indirect Costs": For the purposes of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change including but not limited to the following:
      a. Bonds
      b. Insurance
      c. Superintendent
      d. Job Office Personnel
      e. Watchman
      f. Job Office, office supplies and expenses
      g. Temporary facilities and utilities
      h. Home office expenses

2.0 – PRODUCTS (Not Applicable)

3.0 - EXECUTION

A. General Contractor shall submit COR to Architect for review and approval. If approved, the Architect will submit to Owner for final approval. Upon approval by the Owner, the Architect will prepare required number of copies of Change Order DCM Form C-12 (local) and

forward to General Contractor.

B. Three (3) copies of Change Order are required for locally funded projects and three (3) copies are required for PSCA funded projects. All copies must be signed by the General Contractor's Bonding Company with Power of Attorney attached.

- **In close coordination with the Alabama State Department of Education (ALSDE), as of October 1, 2022, all fully locally-funded K-12 projects' O/A Agreements, Amendments, Construction Contracts and Changes Orders must be submitted electronically via DocuSign links available at https://dcm.alabama.gov/forms_publicK12.aspx. Exception: any forms submitted on paper prior to October 1, 2022 will be processed to completion on paper.**

C. Sequence of execution shall be as follows:

1. General Contractor signs all copies of Change Order. Note: Change Order must be signed by an Officer within the company.
2. General Contractor forwards Change Order to their Bonding Company.
3. Bonding Company signs each copy and returns same to G. C.
4. G. C. forwards Change Order to Architect.
5. Architect forwards Change Order to local Board of Education.
6. Superintendent of local Board of Education executes and returns Change Order to Architect.
7. Architect forwards Change Order to either the State Department of Education (local funded projects) or to The State of Alabama Department of Construction Management (PSCA funded projects).
8. All parties will receive a copy of fully executed Change Order from the appropriate state agency for their permanent records.

D. General Contractor may include cost of Change Order on Pay Application only after receipt of fully executed Change Order. This cost shall be included on Pay Application as a separate line-item listing change order number and amount. Billing shall be for the percentage of work completed for the change order within the month covered by that Pay Application.

E. All change(s) in the work shall require approval by the Owner, through the Architect, in advance of the commencement of any work associated with the change(s).

F. Charges against Allowances shall **not** include General Contractor's mark-up.
- Refer to Specification Section 01020 - Allowances -

G. Refer to "*General Conditions of the Contract*" - "*DCM Form C-8* for additional information.

END OF SECTION

1.0 - GENERAL

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.
   1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

C. Warranties
   1. Subcontractors: General Contractor shall provide a one-year warranty from each Subcontractor they have under contract for the project.

   2. Vendors/Suppliers: General Contractor shall obtain a one-year warranty from each Vendor/Supplier for manufactured product used for the project. Example: *XYS Building Products, Inc.* shall provide a one-year warranty for each product they provided for the project, such as, *toilet partitions and hollow metal doors and frames.* This warranty may be on a form or letterhead provided by the Vendor/Supplier and must list all products provided for the project.

   3. Manufacturers: The Manufacturer's warranty for each product shall be placed directly behind the applicable Subcontractor or Vendor/Supplier's warranty within the warranty binder.

   4. Roof Warranties: The executed roofing warranties shall be presented at Final Inspection. Manufacturer's warranties cannot be prorated.

D. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's and limitations on product warranties do not relieve suppliers, manufacturer's and subcontractors required to countersign special warranties with the Contractor.

E. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

F. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

G. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.

H. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise

available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

I. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

J. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier, or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

K. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper. Three (3) sets of warranties and close out documents are required: one set will be retained by the Architect and two sets will be delivered to the Owner.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.

2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.

3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

2.0 - PRODUCTS (Not Applicable)

3.0 - EXECUTION

The One-Year Warranty issued by the General Contractor shall list all disciplines they are covering when there is not a warranty from a Subcontractor. For instance, some General Contractors have Masons employed within their company and, therefore, do not contract Masonry work through a Masonry Subcontractor. In that case, the General Contractor's warranty would list Masonry as part of their itemized list of warranted work. Other typical examples are Painting, Rough Carpentry,

Miscellaneous Metals, etc.

Warranties shall bear the same date as the Date of Substantial Completion. All warranties shall be effective for a period of One Year from Date of Substantial Completion with exceptions for special warranties requiring extended periods of warranty coverage.

This list is designed as an aid to comply with close-out procedures; however, it should not be considered a complete and comprehensive list. General Contractor should review warranty requirements specified in Project Manual.

Warranties shall include, but not be limited, to the following:

Warranties from ALL Subcontractors for this project.

DIVISION 2 - SITE WORK
Site Protection
Site Clearing
Earthwork
Water Distribution
Sanitary Sewerage
Storm Drainage
Hot-Mix Asphalt Paving
Site Concrete Walks, Curbs & Paving

DIVISION 3 – CONCRETE
Cast-In-Place Concrete
Structural Precast Concrete – Plant Cast
Architectural Precast Concrete

DIVISION 4 - MASONRY
Unit Masonry

DIVISION 5 -METALS
Structural Steel
Steel Joists
Steel Roof Deck
Cold Formed Metal Framing
Miscellaneous Metals
Roof Edge Protection

DIVISION 6 - CARPENTRY
Rough Carpentry
Finish Carpentry
Architectural Fiberglass Columns

DIVISION 7 - MOISTURE PROTECTION
Membrane Waterproofing
Solvent Type Dampproofing Coating
Building Insulation
Exterior Insulation and Finish System
Preformed Metal Soffit Panels
Thermoplastic Polyolefin (TPO) Roofing System
Standing Seam Roof and Sheet Metal System
Expansion Joint Systems

Wall Flashing
Caulking and Sealants

NOTE: Provide roofing warranties as stipulated in Division 7 of the specifications, and as required by The State of Alabama Department of Construction Management. Roofing warranties shall be presented at the time of Final Inspection.

DIVISION 8 - WINDOWS AND DOORS
Hollow Metal Doors and Frames
Flush Wood Doors
Coiling Counter Doors
Tornado Resistant Window Systems
Aluminum-Framed Entrances and Storefronts
Sliding Glass Display Doors
Finish Hardware
Glass and Glazing
Laminate Glazing Film

DIVISION 9 – FINISHES
Gypsum Drywall & Light Gauge Metal Stud System
Tile
Acoustical Panel Ceilings
Wood Gym Flooring
Resilient Tile Flooring
Resilient Flooring
Resilient Rubber Base and Accessories
Fluid Applied Resilient Athletic Flooriing
Luxury Vinyl Tile Flooring
Resinous Flooring
Acoustical Panel Treatment
Cementitious Wood Fiber Walls
Painting

DIVISION 10 – SPECIALTIES
Markerboards and Tackboards
Architectural Louvers and Vents
Solid Plastic Toilet Compartments
Identifying Devices
Roof Information Plaque
Metal Sport, Athletic Lockers, and Staff/Corridor Lockers
Protective Cover Walkway
Rod-Supported Extruded Aluminum Canopy
Roof Screens
Toilet Accessories
First Aid Kit

DIVISION 11 - EQUIPMENT
Metal Bollards
Food Service Equipment
Gymnasium Equipment
Indoor Gymnasium Scoreboard

DIVISION 12 - FURNITURE AND FIXTURES
Fire Extinguishers
Miscellaneous Furnishing and Fixtures
Laminate Clad Casework
Mini Blinds
Telescoping Seating

DIVISION 14 – CONVEYING EQUIPMENT
Machine Room-less Hydraulic Passenger Elevators

DIVISION 15 - MECHANICAL – HVAC
Mechanical Systems – Equipment – Labor

DIVISION 15 – PLUMBING and FIRE PROTECTION
Plumbing Systems – Fixtures - Labor

DIVISION 16 - ELECTRICAL
Electrical Systems – Fixtures -Equipment – Material and Labor

See attached WARRANTY FORMS immediately following for General Contractors and Subcontractors.

GENERAL CONTRACTOR WARRANTY FORM

G. C.' S PROJECT NO. _____ **ARCHITECT'S PROJECT NO:** _____

PROJECT NAME: _____

GENERAL CONTRACTOR: _____

(Name and Address) _____

_____

PROJECT OWNER: _____

ARCHITECT: Lathan Associates Architects, P.C., 300 Chase Park South, Suite 200, Hoover, AL 35244

PROJECT SUBSTANTIAL COMPLETION DATE:

This is to certify that we, _____, the General Contractor for the above referenced project, per contract documents, warrant all labor, material and equipment provided and performed for a period of One (1) Year from the Date of Substantial Completion indicated above.

If applicable, we warrant additional work, materials and equipment for One (1) Year on the following:

_____

_____

_____

_____

By: _____
(Name and Title)

Dated this _____ **day of** _____

State of Alabama
County of _____

Sworn to and subscribed before me this

_____ day of _____

_____
Notary Public

My Commission Expires: _____

SUBCONTRACTOR WARRANTY FORM

G. C.' S PROJECT NO. _____ **ARCHITECT'S PROJECT NO:** _____

PROJECT NAME: _____

GENERAL CONTRACTOR: _____

SUBCONTRACTOR: _____

(Name and Address) _____

_____

PROJECT OWNER: _____

ARCHITECT: Lathan Associates Architects, P.C., 300 Chase Park South, Suite 200, Hoover, AL 35244

PROJECT SUBSTANTIAL COMPLETION DATE:

We, _____ (name), Subcontractor for _____ (work),
as described in Specification Section(s) _____, do hereby warrant that all labor and materials provided and performed in conjunction with above referenced project are in accordance with the Contract Documents and will be free from defects due to defective materials and/or workmanship for a period of One (1) year from the Date of Substantial Completion indicated above or as required by the Specification Section relevant to your trade.

Should any defect develop during the warranty period due to improper materials and/or workmanship, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner.

The Owner will give Subcontractor written notice of defective work. Should Subcontractor fail to correct defective work within Thirty (30) days after receiving notice, the Owner may, at his option, correct defects and charge Subcontractor cost for such correction. Subcontractor agrees to pay such charges upon demand.

Warranty applies to the following Work: _____

_____

By: _____
(Name and Title)

Dated this _____ day of _____

1.0 - GENERAL

A. Closeout requirements for specific construction activities are included in the appropriate Sections in Division 2 through 16.

B. Final Inspection Procedures: See Section 01030 - Special Project Requirements for Inspection Requirements
   1. Deliver tools, spare parts, extra stock, and similar items.
   2. Changeover locks and transmit keys to the Owner.
   3. Complete startup testing of systems and instruction of operation and maintenance personnel. **Obtain signature(s) of all Owner's personnel participating in operation and maintenance instructions.**
   4. Remove temporary facilities, mockups, construction tools, and similar elements.
   5. Complete final cleanup requirements, including touchup painting.
   6. Touch up and repair and restore marred, exposed finishes.

C. After Substantial Completion has been achieved, the General Contractor shall:
   1. Submit final payment request with releases and supporting documentation. Include insurance certificates where required.
      a. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete. Include supporting documentation for completion and an accounting of changes to the Contract Sum.
      b. Advise the Owner of pending insurance changeover requirements.
      c. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
      d. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
      e. Deliver tools, spare parts, extra stock, and similar items.
      f. Changeover locks and transmit keys to the Owner.
      g. Complete startup testing of systems and instruction of operation and maintenance personnel. Obtain signature(s) of all Owner's personnel participating in operation and maintenance instructions.
   2. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
   3. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion.
   4. Submit Consent of Surety to final payment.
   5. Submit Release of Liens.
   6. Submit a final settlement statement.
   7. Submit evidence of continuing insurance coverage complying with insurance requirements.

D. Record Drawings: Maintain a set of prints of Contract Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.
   1. Mark sets with red pencil.
   2. Mark completed record drawings: "As-Built" Set.
   3. Upon completion of the Work, submit record drawings to the Architect for the Owner's records in the form of two (2) CD's.

E. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications. Give attention to substitutions and selection of options and information on concealed construction. Note related record drawing information and Product Data. Mark cover of set: “As-Built”.

Upon completion of the Work, submit record Specifications to the Architect for the Owner's records in the form of two (2) CD’s.

Note: If space allows, both “As-Built” plans and specs may be scanned and saved onto a single CD and 2 copies of record CD’s shall be submitted.

F. Maintenance Manuals: Organize operation and maintenance data into sets of manageable size. Bind in individual, heavy-duty, 3-ring binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.

G. Close-Out Documents

Close-Out Documents consists of the following:

1. General Contractor’s Warranty
2. Subcontractors’ Warranties
3. Manufacturers’ Warranties
4. Affidavit of Advertisement of Completion
5. Consent of Surety to Final Payment
6. Contractor’s Affidavit of Release of Liens
7. Operating and Maintenance Manuals / Instructions to Owner
8. “As-Built” Plans and Specification Manual
9. Owner’s Set of Shop Drawing Submittals

General Contractor shall submit three (3) sets of binders for Items 1-7. Documents should be bound in 3-ring binders in size suitable for amount of material included. Divider tabs should be used to separate items.

If Operating Manuals are large, they can be bound in separate binders as indicated under Paragraph I listed above.

“As-Built” Plans and Specification Manual (2 set of each) should be complete and submitted on CD’s. All plans should be submitted as one set. Do not submit separate sets of “As-Built” plans for Plumbing, HVAC, Electrical, etc.

Architect shall submit one copy of the Shop Drawings to the Owner with close-out documentation.

2.0 - PRODUCTS (Not Applicable)

3.0 - EXECUTION

A. Operation and Maintenance Instructions:

Arrange for each Installer of equipment that requires maintenance to provide instruction in proper operation and maintenance. Include a detailed review of the following items.

1. Maintenance manuals.
2. Spare parts, tools, and materials.

3. Lubricants and fuels.
4. Identification systems.
5. Control sequences.
6. Hazards.
7. Warranties and bonds.
8. Maintenance agreements and similar.

B. As part of instruction for operating equipment, demonstrate the following:
1. Startup and shutdown.
2. Emergency operations and safety procedures.
3. Noise and vibration adjustments.

C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.
1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
5. Clean the site of rubbish, litter, and foreign deposits. Rake grounds to a smooth, even textured surface.

D. Pest Control: Engage a licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

E. Removal of Protection: Remove temporary protection and facilities.

F. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the contract including General and Supplementary Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION

A. This Work of this Section includes the protection and preservation from injury or defacement of all vegetation and objects designated to remain and the prevention of silts and increased run off leaving the site during or after site development.

B. The Contractor is solely responsible for controlling runoff and siltation from the site and onto protected or undisturbed areas of the site or adjacent sites. Means and methods described herein are the minimum acceptable.

C. The Work of this Section is incidental to the Contract and will not be paid for separately except where unit prices may be in effect.

D Related Sections: Divisions 2 Earthwork.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. General:

   a. Listings: Issues listed by references, including revisions of issuing authority, from part of this specification to extent indicated. Issues listed are identified by number, edition, date, title, or other designation established by issuing authority. Issues subsequently referred to are referred to by an issuing authority abbreviation and a basic designation.
   b. Modification: Modifications to reference standards, if any, are noted with standard.

2. Alabama Dept. of Transportation (ALDOT), Standard Specifications for Highway Construction, latest Edition: Section 665. Hay bales and Silt Fencing: Section 871, Fencing material.
3. Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, latest Edition.
4. Local Codes, Ordinances, Regulations.

B Pre-Construction Meeting: Before proceeding with site operations, review site features to remain and be protected at the site with Owner and Architects.

C. Tree Damage:

1. If any trees to be saved are severely injured so as to cause a loss of natural character to the crown, or so as to impair the life support system

or to cause death as a result of construction operation, the Contractor agrees to pay fifty dollars ($50.00) per one inch (1") of caliper, measured four feet (4') above the ground, for trees one inch (1") in caliper and larger, as fixed and liquidated damages, as determined by the Architects..

2. Severely damaged trees requiring liquidated damages will be determined by the Architects.
3. Damaged trees which are repairable as determined by the Architect shall be repaired by a qualified tree surgeon, approved by the Architect, and whose services will be at the Contractor's expense.
4. Clean up and repair damages to Owner's satisfaction.

D. Site Damage:

1. If any protection materials or measures are dismantled, removed or altered, even temporarily, or if areas of the site designated to remain are utilized in any manner without the Architects written authorization, the Contractor agrees to pay the Owner Five Hundred Dollars ($500.00) per infraction, as determined by the Architect, as fixed and liquidated damages.

PART 2 - PERFORMANCE REQUIREMENTS

2.1 PRODUCT/MATERIAL DESCRIPTION

A. Wattles and Silt Fencing:

1. In accordance with ALDOT Section 665.

2. Install at perimeter of clearing and grading operations where shown on Drawings (or as directed) as part of temporary erosion control and site protection.

PART 3 - EXECUTION

3.1 JOB CONDITION

A. It is intended that the part of the property on which new construction does not occur remain undisturbed and as is.

B. Confine storage of materials, temporary facilities, and staging to areas approved by the Architect.

C. Do not carry on construction operations or materials storage within five feet (5') of tree protection fencing or flagging for Limit of Clearing.

3.2 SEDIMENTATION AND EROSION CONTROL

A. General: Employ erosion control management practices as required by the General Permit for Storm Water Discharges. The Contractor is responsible for obtaining any required erosion control permits for construction activity including all permit application fees. The Contractor will be responsible for application and maintenance of all conditions required by the permit. The Contractor is to be responsible for all requirements of the permit until acceptance of all work under this Contract.

B. Control and abate water pollution and erosion at its potential source; employ downstream sediment entrapment measures as a backup to primary control at the source.

C. Take all reasonable precautions to prevent and suppress fires and other detrimental occurrences which may be caused by construction operations.

D. Protect streams, lakes and reservoirs and drainage systems from contamination by siltation or other harmful materials.

E. The Contractor, his employees and subcontractors shall use conservation practices during the work, which shall include but are not limited to, the following:

1. Comply with all federal, state and local laws, rules and regulations for prevention and suppressive action for forest fires.
2. Protect and preserve soil and vegetation cover on the property and on adjacent lands. Any disturbance of soil and vegetation cover outside the Limit of Clearing line will not be permitted under any condition.
3. Prevent and control soil erosion and gulleying within the property covered by Contract and the lands immediately adjacent thereto as a result of construction.
4. Plan and conduct construction operations in such a manner so as to prevent pollution of streams, lakes and reservoirs with sediment or other harmful material used in the construction of the project. Protect downstream properties.
5. Do not deposit waste, loose soil or other materials in live streams, swales or drainage ways.
6. Do not allow fuels, oils, bitumen or other greasy or chemical substances originating from construction operations to enter or be placed where they may enter a live stream or drainageway.
7. Coordinate sedimentation and erosion control measures with the clearing and grubbing operation so that both activities occur in the correct relation to one another.
8. Install and maintain sedimentation and erosion control measures as a continuing program until the site work is complete. This includes, but is not limited to, repairs, any damage from storms, regular maintenance, and removal and disposal of accumulated silt.

F. Wattles shall be anchored by use of stakes.

G. Once installed, maintain silt fence until its capacity has been reached or erosion activity in the areas has been stabilized. When a silt fence has reached its capacity to function and need for a backup fence becomes evident, provide an additional line of silt fence. Repair of a damaged silt fence shall be accomplished by utilizing same type of materials used in original construction.

H. Install and maintain sedimentation and erosion control measures as a continuing program until the site work is complete. This includes repairs, damage from storms, regular maintenance and removal and disposal of accumulated silt.

3.3 MAINTENANCE

A. Maintain erosion control features that have been installed. Maintenance of erosion control features will be considered as an incidental part of the work and no specific payment for this will be made.

END OF SECTION 02125

1.0-GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. State and local codes shall control the disposal of trees, shrubs and other matter from the site clearing and grubbing operations.

C. The contractor shall notify the local agencies prior to beginning work, obtain all required permits, and shall be responsible for complying with their requirements.

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing (to include deep root systems).
4. Topsoil stripping.
5. Removing above-grade site improvements.
6. Removing below grade improvements.
7. Disconnecting, capping or sealing, and abandoning site utilities in place.
8. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections include the following:

1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings according to Division 1 Section "Contract Closeout."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. It shall be the contractor's responsibility to inspect the site to determine any discrepancies which would affect his work and to make allowable for such discrepancies in the contract sum and to notify the architect in writing of such discrepancies.

B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.

D. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

E. Notify utility locator service for area where Project is located before site clearing.

2.0 - PRODUCTS

2.1 SOIL MATERIALS

A. Suitable Soil Materials: Requirements for suitable soil materials are specified in Division 2 Section 02300 "Earthwork."

3.0 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Locate and clearly flag trees and vegetation to remain.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 UTILITIES

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

B. Excavate for and remove underground utilities indicated to be removed.

3.3 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade or as required by Owner’s on-site Geotechnical Engineer.
4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with suitable soil material, unless further excavation or earthwork is indicated.

1. Place fill material in accordance with Section 2300 Earthwork, to make the surface conform to the surrounding original ground surface.

C. Remove existing boulders above cut slope areas as needed to prevent toppling.

3.4 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Maximum slope of topsoil pile 3H:1V
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.

4. Stockpile surplus topsoil and allow for re-spreading deeper topsoil.
5. Existing topsoil to not be used within the limits of the track. Off-site topsoil shall be used with the select soil blend.

3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing, full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.6 DISPOSAL

A. Disposal: Remove surplus soil material, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02230

1.0 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Geotechnical Report by Terracon Consultants, Inc. Project Number: E1255091 dated June 17, 2025. Copies can be obtained from Terracon at (205) 942-1289.

1.2 SUMMARY

A. This Section includes grading (excavating and filling) as indicated on drawings to required lines, dimensions, contours, and elevations for proposed improvements, and the following:

1. Removal of existing improvements in conflict with proposed improvements.
2. Stripping and stockpiling of topsoil. Remove any excess topsoil from the site upon final stabilization.
3. Scarifying, moisture conditioning, compaction, and testing of previously graded areas to ensure proper preparation and acceptance.
4. Excavation and embankment placement to required lines, grades, and elevations.
5. Importing of off-site borrow material suitable for structural fill as well as exporting any excess material.
6. Remove materials from grading operations that are determined unsuitable by the Geotechnical Engineer from site and dispose of off-site.
7. Preparation of areas to receive fill and preparation of excavation areas.
8. Undercutting and replacing soft, unsuitable material like “fat” clays, old fill, organic materials, etc. with compacted engineer fill obtained from an off-site source meeting the project specifications.
9. Over-excavation of low consistency soils below footings and backfill with flowable fill or lean concrete.
10. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
11. Excavating and backfilling trenches for buried utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Division 1 Section "Unit Prices" for a schedule of unit prices.
2. Division 1 Section "Construction Facilities and Temporary Controls."

1.3 UNIT PRICES

A. All excavation shall be unclassified.

B. However, all stabilization and undercut & replacement will be handled with a quantity allowance with unit price being provided on the bid proposal form to be

included in the base bid. The bid proposal form will have unit prices for the undercutting of unsuitable soils and replacing with compacted structural fill. The quantity allowance breakdown is as follows:

Unsuitable soils and replacing with compacted structural fill: 2,000 CY

The unit price for “undercutting” shall include all cost associated with removing unsuitable soil from below the established subgrade elevation, off-site disposal and replacing with off-site material conforming to the project specifications and compacted to project requirement. Unsuitable material refers to material that is not suitable for building or pavement support for reasons associated with material properties, such as highly plastic soils, “fat” clays, and old fill. Material, which is otherwise suitable, but above the optimum moisture and requires moisture conditioning prior to use as engineered fill shall not be considered as “unsuitable”. Note the unit prices are being provided for the addition to and deletion from the contract base bid as required by changing field conditions during construction.

C. The measurement process for unsuitable soil amounts shall be the initial responsibility of the contractor. The basis for measurement will be based on a before and after cross section survey of the area in question performed by a licensed surveyor. No truck counts will be allowed. Measurements will be verified by the Owner’s on-site Geotechnical Engineer.

1.4 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Cut line: Elevations, lines, and final cut subgrades in cut over excavated areas.

F. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

G. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations or "cut line" as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
3. Unauthorized Excavation: Excavation below subgrade elevations or "cut line" or beyond indicated dimensions without direction by Geotechnical engineer and Architect. Unauthorized excavation, as well as remedial

work directed by Geotechnical Engineer and Architect, shall be without additional compensation.

H. Structural Fill: Systematically compacted soil materials used to raise existing grades.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Unsuitable material:

1. Fills: Topsoil; Frozen materials; construction materials; clods of clay and stones larger than 4" (unless otherwise specified); organic material, including silts; and inorganic material including silts which are to wet to be stable, or other materials identified by the Geotechnical Engineer.
2. Existing subgrade: Same materials as listed in paragraph 1 above that are not capable of direct support of slabs, pavement and similar items with the possible exception of improvement by compaction, proof rolling, or similar methods as directed and approved by the Geotechnical Engineer.
3. Unsuitable materials identified by the geotechnical report and drawings shall be anticipated and included in the base bid. See 1.3B Unit Prices for additional information.

M. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

A. Submit per conditions of contract and Division 1.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

1.6 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548. (To be employed by the owner).

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and/or the Engineer and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.
4. Existing utilities shown on the drawings are from a combination of field locations, and utility company records. It is the Contractor's responsibility to field verify existing utilities prior to excavation.

B. Demolish and completely remove from site existing underground utilities indicated to be removed or implied to be removed by new construction and not noted to remain. Coordinate with utility companies to shut off services if lines are active.

C. Contours and existing topography shown on the drawings are believed to be reasonably correct. It shall be the Contractors responsibility to determine any discrepancies which would affect his work, to make allowance for such discrepancies in the contract sum and notify the Architect in writing of such discrepancies and allowances made.

1.8 REFERENCE STANDARDS

A. Follow most current publications from part of this specification to the extent indicated by references thereto.

B. American Association of State Highway and Transportation Officials Standard Specifications (AASHTO).

C. American Society for Testing and Material (ASTM):

1. D 422 Method for Particle Size Analysis of Soil.
2. D 698 Tests for Moisture-Density Relations of Soils, Using 5.5 lb. (2.5 Kg) Rammer and 12-inch (304.8 mm) Drop (Standard Proctor)
3. D 1556 Test for Density of Soil in Place by the Sand Cone Method.
4. D 1557 Test for Moisture-Density Relations of Soils Using 10-lb. (4.5 Kg) Rammer and 18-inch (457 mm) Drop (Modified Proctor)
5. D 1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus.
6. D 2167 Test for Density of Soil in Place by the Rubber Balloon Method.
7. D 2216 Laboratory Determination of Moisture Content of Soil.
8. D 2487 Classification for Soils for Engineering Purpose.
9. D 2922 Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
10. D 3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
11. D 4318 Test Plastic Limit, Liquid Limit and Plasticity Index of Soils.
12. C 25 Chemical Analysis of Limestone, Quicklime and Hydrated Lime.

13. C 110 Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method.
14. C 618 Specification for Fly Ash and Raw of Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
15. C 977 Quicklime and Hydrated Lime for Soil Stabilization.

D. Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest Edition.

E. State, City, or County Standards and Specifications, or other requirements.

2.0 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Topsoil:

1. Materials considered useful for topsoil by the Architect shall be stockpiled at his direction at locations shown on the Drawings or as directed in the field. Topsoil shall be kept free from sub-soil, clay lumps, brush, objectionable weeds, litter, stones larger than 1/2 inches in diameter, stumps, roots, and other materials that would interfere with planting and maintenance operations.
2. All topsoil shall be stored on the site by Contractor in a location approved by the Architect. The Contractor shall use such topsoil for the purpose of fulfilling the topsoil requirements specified in this Contract. Protect stockpile by immediately compacting, dressing down and seeding with annual rye for temporary cover. Provide a silt fence around the base of topsoil pile, after completing storage, to control erosion.
3. Use topsoil stockpiles on site as necessary to complete landscape work indicated on Drawings and in accordance with specifications for landscaping.

C. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, GC, SC, SW, SP, SM, MH, ML, and CL, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Soils that exhibit a liquid limit less than 50 and a plasticity index of less than 25.

D. Unsatisfactory Soils: ASTM D 2487 soil classification groups CH, OL, OH, and PT, or a combination of these group symbols.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

E. Backfill and Fill: Satisfactory soil materials.

F. Subbase: At least 90 percent passing a 1-1/2 inch passing a No. 200 sieve.

G. Base: ASTM D2940; with at least 95 percent passing a 1-1/2 inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

I. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

J. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.

K. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

3.0 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

1. Erosion control is the responsibility of the Contractor. Items shown on the Drawings are considered the minimum acceptable; however, as site conditions change, additional measures may be required to control sediment.
2. The Contractor shall indemnity and hold harmless the Owner, Architect, Engineer, Owner's representatives, and their agents and employees from any claim from their work.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. No explosives will be allowed.

3.4 EXCAVATION, GENERAL

A. All excavation on this project is unclassified regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

B. Material encountered in grading operation that, in the opinion of the Geotechnical Engineer or Owner, is unsuitable or undesirable shall be as follows:

1. The removal of unsuitable material will be directed by the Geotechnical Engineer or his field representative. All unsuitable material that is removed by the Contractor shall become the property of the Contractor and be disposed of off site or in a manner satisfactory to the Owner at no additional cost. All undercut shall be included in the Base Bid. See section 1.3 B. unit prices for quantity allowances.

2. Back fill for these areas will be with material approved by the Geotechnical Engineer, with layers of acceptable material compacted to the requirements set forth in these specifications.

C. Undercutting and replacement of unsuitable soils may be required to the underlying stiff soils. All undercut and replacement shall be handled in accordance with 1.3B Unit Prices above.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 feet. Extend excavations a minimum of 10' in distance from structures

for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 ft. Do not disturb bottom of excavations intended for bearing surface.

B. Where unsuitable soils are encountered, the soils shall be completely removed to underlying stiff material per 1.3B Unit Prices above.

3.6 EXCAVATION FOR WALKS AND PAVEMENT

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades, to a distance of 8' beyond the edge of these walks and pavements.

B. Where unsuitable soils are encountered, the soils shall be completely removed to underlying stiff material per 1.3B Unit Prices above.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipe sizes 30" and below, the "cut line" shall be 4" below the bottom of the pipe and material replaced with 4" No. 57 stone bedding unless otherwise noted.
2. For pipe sizes larger than 30", the "cut line" shall be 6" below the bottom of the pipe and material replaced with 6" no. 57 stone bedding unless otherwise noted.

3.8 APPROVAL OF SUBGRADE

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades. Areas exhibiting soil that deflects excessively during proof rolling should be excavated and replaced with compacted backfill, mechanically stabilized by moisture conditioning and compaction, or stabilization with a geosynthetic covered by appropriate compacted backfill. The appropriate method of subgrade stabilization shall be determined by the Owner's on-site geotechnical engineer.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, damp-proofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with lean concrete to elevation of bottom of footings.

C. Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
2. If ALDOT #57 stone is utilized, then the backfill shall be vibro-compacted with a minimum of 6 passes of a vibratory plate compactor. Dense graded gravel, #8910 or equal, shall be compacted to a minimum compaction requirement of 98% Modified Proctor maximum dry density.

E. Utility trenches penetrating beneath the building shall be effectively sealed to restrict water intrusion and flow through the trenches. Provide a trench plug that extends at least 5 feet from the face of the building exterior. The plug material shall consist of cementitious flowable fill or low permeability clay. The trench plug material shall be placed to surround the utility line. If used, the clay plug material shall be placed and compacted to comply with water content and compaction requirements for structural fill.

F. Coordinate backfilling with utilities testing.

G. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

H. Place and compact final backfill of satisfactory soil material to final subgrade.

I. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Off-site borrow materials may be used as fill within the building and pavement areas provided that their plasticity index (PI) less than 30. Material shall have a minimum dry density of 100 pcf.

D. High plasticity (fat clays) soils should not be used as engineered fill.

E. Keying in/benching of proposed fill slopes into the existing/natural grade is required to a minimum 10’ horizontal distance as measured from the proposed toe of slope back to natural grade.

F. Fill slopes shall be constructed from the bottom up in horizontal lifts, overfilled and then cut back to the planned slope limits so that the entire slope mass

(including the slope face) is uniformly compacted with a consistent, uniform slope face.

G. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within -2 percent to +3 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight. This work will be at the Contractor's expense.

3.15 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Fill to extend 5' outside of the proposed building footprint.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698 (standard proctor).

1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 8 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
2. Under walkways, scarify and re-compact top 8 inches below subgrade and compact each layer of backfill or fill material at 98 percent.
3. Under lawn or unpaved areas, scarify and re-compact top 8 inches below subgrade and compact each layer of backfill or fill material at 98 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.17 ft.
2. Walks: Plus or minus 0.10 ft.
3. Pavements: Plus or minus 0.10 ft.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 0.08 ft. when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

A. Drainage Piping: Drainage pipe is specified in Division 2 Section "Foundation Drainage Systems."

B. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 98 percent of maximum dry density according to ASTM D 698.
2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.18 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.
3. Shape subbase and base to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

B. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.19 DRAINAGE COURSE

A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. Compact drainage course to required cross sections and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.
2. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.
3. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 1000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

1.0 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. All water mains shall be in strict accordance with the local utility authority's requirements.

1.2 SUMMARY

A. This Section includes water-distribution piping and specialties outside the building for the following:

1. Water services.

B. Utility-furnished products include water meters that will be furnished to the site, ready for Installation.

1.3 DEFINITIONS

A. Water-Distribution Piping: Interior domestic-water piping.

B. Water Service: Exterior domestic-water piping.

C. The following are industry abbreviations for plastic materials:

1. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Piping specialties.
2. Valves and accessories.
3. Water meters and accessories.
4. Backflow preventers and assemblies.
5. Protective enclosures.

B. Shop Drawings: For the following:

1. Precast concrete vaults, including frames and covers, ladders an and drains.
2. Wiring Diagrams: Power, signal and control wiring.

C. Coordination Drawings: For piping and specialties including relation to other services in same area. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field Quality-Control Test Reports: From Contractor.

E. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 include the following:

1. Water meters.
2. Valves.
3. Backflow preventers.
4. Protective enclosures.

F. Record drawings: At project close-out of installed water service piping according to Division 1.

G. Purging and disinfecting reports.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of piping and specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements." Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions".

B. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable water service piping, including materials, installation, testing and disinfection
3. Comply with standards of authorities having jurisdiction for fire suppression water-service piping, including materials, hose threads, installation and testing.

C. Piping materials shall bear label, stamp, or other markings of specified testing agency.

D. 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.

E. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

F. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

G. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support piping to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

B. Perform site survey, research public utility records and verify existing utility locations. Contact utility-locating service for the area where project is located.

C. Verify that water-service piping may be installed to comply with original design and reference standards.

D. Site information: Reports on subsurface condition investigations made during design of project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions between soil borings. Owner assumes no responsibility for interpretations or conclusions drawn from this information.

1.8 COORDINATION

A. Coordinate connection to water main with utility company.

B. Coordinate piping materials, sizes, entry locations and pressure requirements with building distribution & fire protection piping.

C. Coordinate with other utility work.

D. Coordinate electrical wiring for tamper switches, vault heaters, and sump pumps.

2.0 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

2.3 PVC PIPE AND FITTINGS

A. PVC, Schedule 40 Pipe: ASTM D 1785.

1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.

B. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket and spigot end.

1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 JOINING MATERIALS

A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

B. Transition Couplings:

1. Underground Piping, NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
2. Underground Piping, NPS 2 (DN 50) and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
3. Aboveground or Vault Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.5 PIPING SPECIALTIES

A. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

B. Dielectric Fittings: Combination of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.

1. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig minimum working pressure at 180 deg F (82 deg C). Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
2. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig minimum working pressure to suit system pressures.
3. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

    a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.

4. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 deg F.
5. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig minimum working pressure at 225 deg F.

2.6 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:
1. Nonrising-Stem, Metal-Seated Gate Valves: AWWA C500, gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

a. Minimum Working Pressure: 200 psig.
b. End Connections: Mechanical joint.
c. Interior Coating: Complying with AWWA C550.

2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.

1. Tapping Sleeve: Cast- or ductile-iron or stainless steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.

2. Valve: AWWA, cast-iron, nonrising-stem, metal or resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5-inch- diameter barrel.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FM-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

D Indicator Posts: UL 789, FM-approved, horizontal, wall-type, cast-iron body with operating wrench, extension rod, and cast-iron barrel.

2.8 CHECK VALVES

A. AWWA Check Valves:

1. Check Valves: AWWA C508, swing-check type with 175-psig working-pressure rating and resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

B. UL-Labeled Check Valves:

1. Check Valves: UL 312, swing-check type with 250-psig working-pressure rating, rubber-faced checks unless otherwise indicated, and ends matching piping.

2.9 DETECTOR CHECK VALVES

A. Detector Check Valves: UL 312, galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends; designed for 175-psig working pressure. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

1. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.

B. Detector Check Valves: UL 312, FM-approved detector check, iron body, corrosion-resistant clapper ring and seat ring material, 175-psig (1207-kPa) working pressure, flanged ends, with connections for bypass and installation of water meter.

2.10 WATER METERS

A. Water meters will be furnished by the local water authority.

2.11 WATER-METER BOXES

A. Description: Cast-iron body and cover for disc-type water meter with lettering "WATER METER" in cover; and slotted, open-bottom base section of length to fit over service piping.

1. Option: Base section may be cast-iron, PVC, clay, or other pipe.

B. Description: Cast-iron body and double cover for disc-type water meter with lettering "WATER METER" in top cover; separate inner cover; air space between covers; and slotted, open-bottom base section of length to fit over service piping.

C. Description: Polymer-concrete body and cover for disc-type water meter with lettering "WATER" in cover; and slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb minimum over 10 by 10 inches square.

2.12 HOSE-CONNECTION, BACKFLOW-PREVENTION DEVICES

A. General: ASSE standard, nonremovable-type, backflow-prevention devices with ASME B1.20.7, garden-hose threads on outlet.

B. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with manual drain feature. Units attached to rough-bronze-finish hose connections may be rough bronze.

C. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3m flow and applications with up to 10-foot head of water back pressure. Include two check valves and intermediate atmospheric vent.

2.13 BACKFLOW PREVENTERS

A. General: ASSE standard, backflow preventers.

1. Working Pressure: 150 psig minimum, unless otherwise indicated.
2. NPS 2 and Smaller: Bronze body with threaded ends.
3. NPS 2-1/2 and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.

    a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.

4. Interior Components: Corrosion-resistant materials.
5. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
6. Strainer: On inlet, if indicated.

B. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.

C. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013 or AWWA C511, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2, air-gap fitting located between two positive-seating check valves.

1. Maximum Pressure Loss: 12 psig through middle 1/3 of flow range.

D. Double-Check-Valve Backflow Prevention Assemblies: ASSE 1015 or AWWA C510, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valves.

1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

E. Double-Check-Valve Backflow Prevention Assemblies: UL 312, FM approved; with two UL 312, FM-approved, iron-body, 175-psig working-pressure, flanged-end check valves and two UL 262, FM-approved, iron-body, outside screw and yoke, flanged, 175-psig working-pressure gate valves.

1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

F. Double-Check-Detector Assembly Backflow Preventers: ASSE 1048, FM approved or UL listed, and suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet. Include test cocks; two positive-seating check valves; and bypass with displacement-type water meter, valves, and double-check backflow preventer.

1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

2.14 CONCRETE VAULTS

A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.

B. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.

C. Manhole: ASTM A 48, Class No. 35 (ASTM A 48M, Class No. 250) minimum tensile strength, gray-iron traffic frame and cover.

1. Dimensions: Not smaller than 24-inch diameter, unless otherwise indicated.

D. Drain: ASME A112.21.1M, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

2.15 PROTECTIVE ENCLOSURES

A. Protective Enclosures, General: ASSE 1060, outdoor weather-resistant enclosure designed to protect aboveground water piping equipment or specialties from vandalism. Include size and dimensions indicated but not less than those required for access and service of protected unit.

B. Freeze-Protection Enclosures: Insulated and with heat source to maintain minimum internal temperature of 40 deg F (4 deg C) when external temperatures reach as low as minus 34 deg F (minus 36 deg C).

1. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
2. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

a. Housing: Reinforced-aluminum or fiberglass construction.

1) Drain opening for units with drain connection.
2) Access doors with locking devices.
3) Insulation inside housing.
4) Anchoring devices for attaching housing to concrete base.

b. Electric heating cable or heater with self-limiting temperature control.

C. Precast concrete base of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

2.16 FIRE HYDRANTS

A. All fire hydrants shall be in accordance with the specifications and standards of the local fire department and utility company.

3.0 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

C. Do not use flanges, unions, or keyed couplings for underground piping.

D. Flanges, unions, keyed couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground Water-Service Piping: Use any of the following piping materials for each size range:

1. NPS 3/4 to NPS 3-1/2: PVC, Schedule 40 pipe and fittings
2. NPS 4 to NPS 8: Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed or joints or PVC, C900, Class 200 pipe and fittings.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FM, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, high-pressure, resilient seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FM, cast-iron, nonrising-stem gate valves with indicator post.
3. Use the following for valves in vaults and aboveground:

a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising-stem.
b. Gate Valves, NPS 3 and Larger: UL/FM, cast iron, OS&Y rising stem.
c. Check Valves: AWWA C508, swing-check valves.

4. Detector Check Valves: Use for water-service piping in vaults and aboveground to detect unauthorized use of water.

3.4 JOINT CONSTRUCTION

A. See Division 2 Section "Utility Materials" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with keyed couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
4. Copper Tubing Soldered Joints: ASTM B 828. Use flushable flux and lead-free solder.
5. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to

ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.

B. Make connections larger than NPS 2 with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

C. Make connections NPS 2 and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
4. Install corporation valves into service-saddle assemblies.
5. Install manifold for multiple taps in water main.
6. Install curb valve in water-service piping with head pointing up and with service box.

D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

E. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.

F. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 36 inches cover over top.
2. Under Railroad Tracks: With at least 48 inches cover over top.
3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

G. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.

H. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

I. Anchor service-entry piping to building wall.

J. See Division 15 Section "Domestic Water Piping" for potable-water piping inside the building.

3.6 ANCHORAGE INSTALLATION

A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Fire-Service-Main Piping: According to NFPA 24.

B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. UL/FM Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

C. Detector Check Valves: Install in vault or aboveground.

3.8 DETECTOR CHECK VALVE INSTALLATION

A. Install detector check valves for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

B. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

3.9 WATER-METER INSTALLATION

A. Install water meters, piping, and specialties according to utility company's written requirements.

3.10 ROUGHING-IN FOR WATER METERS

A. Rough-in piping and specialties for water-meter installation according to utility company's written instructions and requirements.

3.11 BACKFLOW-PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers with relief drain in vault or other space subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.12 VAULT INSTALLATION

A. See Division 3 Section "Cast-in-Place Concrete" for concrete vaults.

B. Install precast concrete vaults according to ASTM C 891.

C. Connect drain outlet to storm drainage piping. Refer to Division 2 Section "Storm Drainage."

3.13 PROTECTIVE ENCLOSURE INSTALLATION

A. Install concrete base level and with top approximately 2 inches above grade.

B. Install protective enclosure over valves and equipment.

C. Anchor protective enclosure to concrete base.

3.14 CONNECTIONS

A. Piping installation requirements are specified in other Division 2 Sections. Drawings indicate general arrangement of piping and specialties.

B. See Division 2 Section "Utility Materials" for piping connections to valves and equipment.

C. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

D. Connect water-distribution piping to post hydrants and drinking fountains.

E. Connect water-distribution piping to interior domestic-water and fire-suppression piping.

F. Connect waste piping from drinking fountains to sanitary sewerage system. See Division 2 Section "Sanitary Sewerage" for connection to sanitary-sewer.

G. Ground equipment according to Division 16 Section "Grounding and Bonding."

H. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.15 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.16 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Division 2 Section "Earthwork" for underground warning tapes.

B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Division 2 Section "Utility Materials" for identifying devices.

3.17 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.

d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 02510

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. All sanitary sewerage shall be in strict accordance with the local sewer authority's standards and specifications.

1.2 SUMMARY

A. This Section includes sanitary sewerage outside the building.

B. Related Sections include the following"

1. Division 3 Section "Cast-in-Place Concrete" for concrete structures.

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

1.4 SUBMITTALS

A. Shop Drawings: Include plans, elevations, details, and attachments for the following:

1. Precast concrete manholes, including frames and covers.

B. Field Test Reports: Indicate and interpret results for compliance with performance requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe, pipe fittings, and seals from dirt and damage.

B. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting, materials.

2.2 PIPES AND FITTINGS

A. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints

1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
3. Gaskets: AWWA C111, rubber.

B. PVC Pressure Pipe: AWWA C900, Class 150 for gasketed joints.

1. PVC Pressure Fittings.
2. Gaskets for PVC Piping: ASTM C907, for gasketed joints.
3. Ductile-Iron, Compact Fittings: AWWA C153, for push-on joints.
4. Gaskets for Ductile-Iron Fittings: AWWA C111, rubber.

2.3 MANHOLES

A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Diameter: 48 inches minimum, unless otherwise indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
5. Top Section: Concentric-cone type, unless eccentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Gaskets: ASTM C 443, rubber.
7. Grade Rings: Include two or three reinforced-concrete rings, 6- to 9-inch total thickness, that match 24-inch diameter frame and cover.
8. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.
9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Heavy-Traffic Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.

1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to structure, as required to prevent flotation.
2. Gaskets: Rubber.
3. Grade Rings: Include two or three reinforced-concrete rings, 6- to 9-inch total thickness, to match 24-inch diameter frame and cover.

4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615 and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
5. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.

D. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.

1. Type: Solid.

2.4 CONCRETE

A. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 2 percent through manhole.

2.5 PROTECTIVE COATINGS

A. Description: One- or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:

1. Concrete Manholes: On exterior and interior surfaces.

2. Manhole Frames and Covers: On entire surfaces.

2.6 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

1. Light Duty: In earth or grass foot-traffic areas.

2. Medium Duty: In paved foot-traffic areas.

3. Heavy Duty: In vehicle-traffic areas.

4. Extra-Heavy Duty: In roads.

5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section “Earthwork.” Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 PIPING APPLICATIONS

A. General: Include watertight joints.

B. Refer to Part 2 of this Section for detailed specification for pope and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

C. Gravity-Flow Piping: Use the following:

1. Ductile-iron sewer pipe; standard- or compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.

3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

1. Use the following pipe couplings for non-pressure applications:

a. Sleeve type to join piping, of same size, or with small difference in OD.
b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
c. Bushing type to join piping of different sizes where annular space between smaller piping’s OD and larger piping’s ID permits installation.

3.5 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements,

and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
2. Install piping with 36-in minimum cover.

F. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

G. Install ductile-iron, force-main piping according to AWWA C600.

H. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or combination of both.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated

B. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.

C. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.

1. Install PE film, pipe encasement over ductile-iron sewer pipe and ductile-iron fittings according to ASTM A 674 for AWWA C105.

3.7 MANHOLE INSTALLATION

A. General: Install manholes complete with appurtenances and accessories indicated.

B. Form continuous concrete channels and benches between inlets and outlet.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

E. Construct cast-in-place manholes as indicated.

3.8 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch Insert other above surrounding grade.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.9 TAP CONNECTIONS

A. Make connections to existing piping and underground structures so finished Work strictly complies with local requirements.

B. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.10 CLOSING ABANDONED SANITARY SEWERAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch- Insert other thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:

1. Remove manhole and close open ends of remaining piping.
2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
3. Backfill to grade according to Division 2 Section "Earthwork."

3.11 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. Place plug in end of incomplete piping at end of day and when work stops.
2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfills is in place, and again at completion of project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball of cylinder of size not less than 92.5 percent of piping diameter.
    c. Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. If authorities having jurisdiction do not have published procedures, perform tests as follows:

    a. Sanitary Sewerage: Perform hydrostatic test.

        1) Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.
        2) Close openings in system and fill with water.
        3) Purge air and refill with water.
        4) Disconnect water supply.
        5) Test and inspect joints for leaks.
        6) Option: Test ductile-iron piping according to AWWA C600, "Hydrostatic Testing". Use test pressure of at least 10 psig

    b. Sanitary Sewerage: Perform air test according to UNI-B-6.

        1) Ductile-Iron Piping: Test according to AWWA C600, Section “Hydraulic Testing.”

6. Manholes: Perform hydraulic test according to ASTM C 969.
7. Leaks and loss in test pressure constitute defects that must be repaired.
8. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 02530

1.0 - 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 storm drainage outside the building.

1.3 DEFINITIONS

A. HDPE: High Density Polyethylene plastic.

B. PVC: Polyvinyl chloride plastic.

C. RCP: Reinforced concrete pipe.

D. DIP: Ductile-iron pipe.

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

1.5 SUBMITTALS

A. Shop Drawings: Include plans, elevations, details, and attachments for the following:

1. Precast concrete manholes and other structures, including frames, covers, and grates.
2. Cast-in-place concrete manholes and other structures, including frames, covers, and grates.

B. Design Mix Reports and Calculations: For each class of cast-in-place concrete.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Architect's written permission.

2.0 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.2 PIPES AND FITTINGS

A. Corrugated PE Pipe and Fittings: AASHTO M 294, Type S, with smooth waterway for coupling joints.

1. Soiltight Couplings: AASHTO M 294, corrugated, matching pipe and fittings to form soiltight joints.
2. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings to form silttight joints.

B. PVC Sewer Pipe and Fittings: According to the following:

1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints.

a. Gaskets: ASTM F 477, elastomeric seals.

C. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, Class III, Wall B, (unless otherwise indicated) for gasketed joints.

1. Gaskets: ASTM C 443, rubber.

2.3 SPECIAL PIPE COUPLINGS AND FITTINGS

A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for non-pressure joints.

1. Sleeve Material for Concrete Pipe: ASTM C 443, rubber.
2. Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
3. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
4. Bands: Stainless steel, at least one at each pipe insert.

B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.

1. Material for Concrete Pipe: ASTM C 443, rubber.
2. Material for Plastic Pipe: ASTM F 477, elastomeric seal.
3. Material for Dissimilar Pipe: Compatible with pipe materials being joined.

2.4 MANHOLES

A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Diameter: 48 inches I.D. 5' depth, 60" I.D. > 5' depth, unless otherwise indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.
4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
5. Top Section: Concentric-cone type unless eccentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Gaskets: ASTM C 443 rubber.
7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover. Final height adjustment can be made with courses of brick totaling no more than 16 inches.
8. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 48 inches deep.
9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Heavy-Traffic Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.

1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to structure, as required to prevent flotation.
2. Gaskets: Rubber.
3. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.
4. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 48 inches deep.
5. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Ballast: Increase thickness of concrete, as required to prevent flotation.
2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.

3. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 48 inches deep.

D. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch- diameter cover. Include indented top design with lettering "STORM SEWER" cast into cover.

2.5 CATCH BASINS

A. Normal-Traffic, Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.
2. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
3. Top Section: Concentric-cone type unless eccentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Gaskets: ASTM C 443, rubber.
5. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and grate.
6. Steps: ASTM C 478 individual steps or ladder. Omit steps for catch basins less than 48 inches deep.
7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Heavy-Traffic, Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.

1. Gaskets: Rubber.
2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and grate.
3. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
4. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Bottom, Walls, and Top: Reinforced concrete.
2. Channels and Benches: Concrete.
3. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy-duty service. Include flat grate with small, square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum, unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

E. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter flat grate with small, square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio.

1. Include channels and benches in manholes.

a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

1) Invert Slope: 2 percent through manhole.

b. Benches: Concrete, sloped to drain into channel.

1) Slope: 4 percent.

2. Include channels in catch basins.

a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

1) Invert Slope: 2 percent through catch basin.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

3.0 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 PIPING APPLICATIONS

A. General: Include watertight, silttight, or soiltight joints, unless watertight or silttight joints are indicated.

B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

C. Gravity-Flow Piping: As indicated on the drawings.

3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
1. Use the following pipe couplings for non-pressure applications:

a. Sleeve type to join piping, of same size, or with small difference in OD.
b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.5 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to the extent practical.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

C. Use manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity-flow piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Install piping with 36-inch minimum cover, unless otherwise indicated.

F. Extend storm drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated.

B. Install with top surfaces of components, except piping, flush with finished surface.

C. PE Pipe and Fittings: As follows:

1. Join pipe, tubing, and fittings with couplings for soiltight joints according to manufacturer's written instructions.
2. Install according to ASTM D 2321 and manufacturer's written instructions.
3. Install corrugated piping according to the Corrugated Polyethylene Pipe Association's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."

D. PVC Pressure Pipe and Fittings: Join and install according to AWWA M23.

E. PVC Sewer Pipe and Fittings: As follows:

1. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
2. Install according to ASTM D 2321.

F. Concrete Pipe and Fittings: Install according to ACPA's "Concrete Pipe Installation Manual." Use the following seals:

1. Round Pipe and Fittings: ASTM C 443, rubber gaskets.
2. Arch Pipe: ASTM C 877, Type I, sealing bands.

G. Ductile-iron Culvert Piping: Install according to AWWA C600 for push-on joints.

H. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.

I. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

3.7 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Form continuous concrete channels and benches between inlets and outlet.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

E. Construct cast-in-place manholes as indicated.

3.8 CATCH-BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.9 STORM DRAINAGE INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipators at outlets, as indicated.

3.10 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.11 TAP CONNECTIONS

A. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.

B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

C. Make branch connections from side into existing piping. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

D. Make branch connections from side into existing piping, NPS 18 or larger, or to underground structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of

connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

1. Use concrete that will attain minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.12 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch- thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Structures: Excavate around structure as required and use one procedure below:

1. Remove structure and close open ends of remaining piping.
2. Remove top of structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
3. Backfill to grade according to Division 2 Section "Earthwork."

3.13 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plug in end of incomplete piping at end of day and when work stops.
3. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. Leaks and loss in test pressure constitute defects that must be repaired.
6. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

END OF SECTION 02630

1.0 - 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. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving overlay.
4. Asphalt surface treatments.
5. Pavement-marking paint.
6. Cold milling of existing hot-mix asphalt pavement.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for aggregate base courses.

1.3 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

B. DOT: Department of Transportation.

1.4 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT. Retain first subparagraph below if standard specifications are indicated on Drawings.

1. Standard Specification: Alabama Department of Transportation (ALDOT) "Standard specifications for highway construction" latest edition.
2. Measurement and payment provisions and safety program submittals included in the standard specifications do not apply to this Section.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: For each job mix proposed for the Work.

C. Material Test Reports: For each paving material.

D. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

C. Regulatory Requirements: Comply with "Standard Specifications for Highway Construction" latest edition of ALDOT for asphalt paving work.

D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
2. Review condition of subgrade and preparatory work.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-

based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

2.0 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: Course aggregate shall comply with ALDOT Section 801.

C. Fine Aggregate: Fine aggregate shall comply with ALDOT Section 802.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: Mineral filter shall comply with ALDOT Section 805.

2.2 ASPHALT MATERIALS

A. Base course: Place to width and depth shown and comply with ALDOT Section 825, Type B.

B Asphalt Binder: Bituminous concrete binder layer to width and depth shown on the drawings in accordance with ALDOT Section 424B.

C Prime Coat: Shall be in accordance with ALDOT Section 401.

D Tack Coat: Shall be in accordance with ALDOT Section 405.

E Surface Course: Shall be in accordance with ALDOT Section 424A.

F Water: Potable.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wet-able powder form.

B. Sand: ASTM D 1073, Grade Nos. 2 or 3.

C. Joint Sealant: ASTM D 3405, hot-applied, single-component, polymer-modified bituminous sealant.

D. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N.

1. Color: As indicated on the drawings.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes meeting the requirements of the applicable sections of the ALDOT "Standard Specifications for Highway Construction" and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: ALDOT 825, Type B.
3. Binder Course ALDOT 424B.
4. Surface Course: ALDOT 424A.

3.0 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Verify that subgrade elevation is as indicated on the drawings.

C. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

D. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 1-1/2 inches.
2. Mill to a uniform finished surface free of gouges, grooves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.
7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of.

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.3 to 0.50 gal./sq. yd. Apply in accordance with ALDOT Section 401.03 (d) 4. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 15 days before starting first coat of pavement marking. Second coat shall be placed 30 – 60 days after the first coat.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply 2 coats of paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils per coat.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.12 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 02741

1.0 – 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 exterior cement concrete for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Walkways.
5. Site walls and footings.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for subgrade preparation, grading, and subbase course.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

D. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or adhesive.
8. Joint fillers.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work 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. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixes.
c. Ready-mix concrete producer.
d. Concrete subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required other construction activities.

2.0 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

C. Epoxy-Coated Welded Wire Fabric: ASTM A 884, Class A, plain steel.

D. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

E. Epoxy-Coated Reinforcement Bars: ASTM A 775; with ASTM A 615, Grade 60, deformed bars.

F. Steel Bar Mats: ASTM A 184; with ASTM A 615, Grade 60, deformed bars; assembled with clips.

G. Plain Steel Wire: ASTM A 82, as drawn.

H. Epoxy-Coated Wire: ASTM A 884, Class A coated, plain steel.

I. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

J. Epoxy-Coated Joint Dowel Bars: ASTM A 775; with ASTM A 615, Grade 60, plain steel bars.

K. Tie Bars: ASTM A 615, Grade 60, deformed.

L. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer coated wire bar supports.

N. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.

1. Fly Ash: ASTM C 618, Class F or C. Use one brand of cement throughout project unless otherwise accepted.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.

D. Blended Hydraulic Cement: ASTM C 595M, Type IP portland pozzolan cement.

E. Blended Hydraulic Cement: ASTM C 595M, Type I (PM) pozzolan-modified portland cement.

F. Blended Hydraulic Cement: ASTM C 595M, Type I (SM) slag-modified portland cement.

G. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:

1. Class: 4S.
2. Class: 4M.
3. Class: 1N.
4. Maximum Aggregate Size: 1-1/2 inches nominal.
5. Maximum Aggregate Size: 1 inch nominal.
6. Maximum Aggregate Size: 3/4 inch nominal.
7. Do not use fine or coarse aggregates containing substances that cause spalling.

H. Water: ASTM C 94.

2.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing Non-Chloride Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

G. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Coloring Agent: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

1. Color: As selected by Architect from manufacturer's full range.

C. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.

1. Color: As indicated.

D. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

E. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

F. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.

G. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.

2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

H. Chemical Surface Retarder: Water-soluble, liquid set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

I. Colored Dry-Shake Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground, nonfading mineral oxides interground with cement.

1. Color: As selected by Architect from manufacturer's full range.

2.7 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 ACI 301 and ACI 318-89, Section 5.3, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.

1. Do not use Owner’s field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi for site walls and footings.
2. Compressive Strength (28 Days): 3000 psi unless noted.
3. Maximum Water-Cementitious Materials Ratio: 0.50 for site walls.
4. Maximum Water-Cementitious Materials Ratio: 0.53 unless noted.
5. Slump Limit: 3-5 inches.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

E. Add air-entraining admixture at manufacturer’s prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:

1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
2. Air Content: 6.0 percent for 1-inch maximum aggregate.
3. Air Content: 6.0 percent for ¾-inch maximum aggregate.

F. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer’s recommended rate, but not less than 1.0 lb/cu. yd.

G. Coloring Agent: Add coloring agent to mix according to manufacturer's written instructions.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

3.0 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
3. Provide tie bars at sides of pavement strips where indicated.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

a. Radius: 1/4 inch.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Radius: 1/4 inch.

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if approved by Architect.

I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

N. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.
c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Contraction Joint Depth: Plus 1/4 inch, no minus.
9. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete pavement to cure for 30 days and be dry before starting first coat of pavement marking. Second coat shall be placed 30 – 60 days after the first.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply 2 coats of paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils per coat.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
8. When total quantity of a given class of concrete is less than 50 cu. yd. Architect may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 02751

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 specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

B. Concrete paving and walks are specified in Division 2.

1.3 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Submit all shop drawings on one reproducible print and two copies only. The reproducible print will be returned. All copies required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.

C. Shop drawings for reinforcement, prepared for fabrication, bending, and placement of concrete reinforcement. Comply with ACI S-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Samples: Submit samples of materials as requested by Architect, including names, sources, and descriptions.

E. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test.

F. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by the manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. ACI 301 "Specifications for Structural Concrete for Buildings".

2. ACI 302 "Guide for Concrete Floor and Slab Construction".

3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing

Concrete".

4. ACI 305 "Hot Weather Concreting".

5. ACI 306 "Cold Weather Concreting".

6. ACI 309 "Guide for Consolidation of Concrete"

7. ACI 311 "Recommended Practice for Concrete Inspection".

8. ACI 318, "Building Code Requirements for Reinforced Concrete."

9. ACI 347 "Recommended Practice for Concrete Formwork".

10. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

11. American Welding Society, AWS D1.4 "Structural Welding Code- Reinforcing Steel".

B. Concrete Testing Service: Employ, at Contractor's expense a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.

C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 FORM MATERIALS:

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.

D. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.

1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.2 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Reinforcement: ASTM A 185, welded steel wire reinforcement.

D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

3. For sand blasted or intentionally roughened concrete surfaces provide supports of stainless steel (CRSI, Class 2).

E. Threaded Dowels: Continuous threaded high-strength steel bars equal to "Lasstud" by Richmond Screw Anchor Co., Inc. Provide inserts compatible with dowels, designed for ultimate pull-out force indicated on the drawings.

F. Steel Shapes, Plates and Rods: Conform to ASTM A 36 "Specification for Structural Steel".

G. Do not weld reinforcing steel unless specifically noted on drawings. If welding is shown, conform to latest revision of AWS D12.1, "Reinforcing Steel Welding Code of the American Welding Society". Perform all welding with certified welders qualified per AWS.

2.3 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout project unless otherwise acceptable to Architect.

B. Fly Ash: ASTM C 618, Type C or Type F.

1. Limit use of fly ash to not exceed 25 percent of cement content by weight.

C. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious sub- stances.

2. Local aggregates not complying with ASTM C 33 but that special tests or actual service have shown to produce concrete of adequate strength and durability may be used when acceptable to Architect.

D. Water: Drinkable.

E. Admixtures, General: Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

G. Water-Reducing Admixture: ASTM C 494, Type A.

H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G.

I. Water-Reducing, Non-Chloride Accelerating Admixture: ASTM C 494, Type E.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

2.4 RELATED MATERIALS:

A. Available Products and/or Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to those listed.

B. Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.

C. Vapor Retarder: Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:

1. Polyethylene sheet not less than 8 mils thick.

D. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as abrasive aggregate for nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, and nonglazing and is unaffected by freezing, moisture, and cleaning materials.

E. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

F. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

G. Liquid Membrane-Forming Curing Compound: Liquid-type membrane- forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.

1. Contractor to verify that product is compatible with other applied finishes.

H. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.

I. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from one inch thick to feathered edges.

J. Bonding Compound: Polyvinyl acetate or acrylic base.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

a. Polyvinyl Acetate (Interior Only):

1) "Superior Concrete Bonder," Dayton Superior Corp.

2) "Euco Weld," Euclid Chemical Co.
3) "Weld-Crete," Larsen Products Corp.
4) "Everweld," L&M Construction Chemicals, Inc.

b. Acrylic or Styrene Butadiene:

1) "Acrylic Bondcrete," The Burke Co.
2) "Strongbond," Conspec Marketing and Mfg. Co.
3) "Day-Chem Ad Bond," Dayton Superior Corp.
4) "SBR Latex," Euclid Chemical Co.
5) "Daraweld C," W.R. Grace & Co.
6) "Hornweld," A.C. Horn, Inc.
7) "Everbond," L & M Construction Chemicals, Inc.
8) "Acryl-Set," Master Builders Inc.
9) "Intralok," W.R. Meadows, Inc.
10)"Sonocrete," Sonneborn-Rexnord.
11)"Stonlock LB2," Stonhard, Inc.

K. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

2.5 PROPORTIONING AND DESIGN OF MIXES:

A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixtures or field experience methods as specified in ACI 318-95 Section 5.3. If trial mixtures method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing, unless otherwise acceptable to Architect.

B. Trial mix designs and strength tests, made by qualified independent material laboratory, in accordance with ACI 318-95 Section 5.3 are required for all concrete designs for which a suitable experience record is not available.

C. Mix design based on a record of past performance in accordance with ACI 318-95 Section 5.3, may be provided by qualified concrete supplier or precast concrete manufacturer for concrete designs. Mix design shall be certified by an independent testing laboratory.

D. All concrete mix designs shall include the following information:

1. Proportions of cement, fine and coarse aggregate and water.

2. Water/cement ratio, design strength, slump and air content.

3. Type of cement and aggregates.

4. Type and dosage of all admixtures.

5. Type, color and dosage of integral coloring compounds, where applicable.

6. Special requirements for pumping.

7. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified.

E. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have

been reviewed by Architect.

F. Design mixes to provide normal weight concrete as indicated on drawings and schedules.

G. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

2.6 ADMIXTURES:

A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.

1. Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

B. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).

C. Use air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having the total air content as shown on the drawings.

D. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

E. Water-Cement Ratio: Provide concrete with the maximum water-cement (w/c) ratios as shown on the drawings.

F. Slump Limits: Proportion and design mixes to result in slump at point of placement as shown on the drawings.

2.7 CONCRETE MIXING:

A. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

B. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.

1. Addition of water to batch for material with insufficient slump will be permitted in accordance with ACI 301.

2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

C. High range water reducing admixture (superplasticizer) redosage may be permitted when prior approval, as to methods and procedures, is obtained from the Architect.

PART 3 - EXECUTION

3.1 GENERAL:

A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS:

A. General: Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 301 Table 4.3.1.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER INSTALLATION:

A. General: Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.

B. Lap joints 6 inches and seal vapor retarder joints with manufacturers' recommended mastic and pressure-sensitive tape.

C. After placement of vapor retarder, cover with sand cushion and compact to depth as shown on drawings.

3.4 PLACING REINFORCEMENT:

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.

1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS:

A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

B. Provide keyways at least 1-1/2 inches deep in construction joints in walls, slabs, beams and between walls and footings.

C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated.

D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

E. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

1. Joint filler and sealant materials are specified in Division 7 Sections of these specifications.

F. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by 1/4 slab depth or approved inserts, unless otherwise indicated. Make saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregates.

1. With prior approval from Architect contraction joints may be formed by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

2. If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

3. Joint sealant material is specified in Division 7 Sections of these specifications.

3.6 INSTALLATION OF EMBEDDED ITEMS:

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARATION OF FORM SURFACES:

A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

B. Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against

which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.8 CONCRETE PLACEMENT:

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.

B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.

C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement.

E. Cold-Weather Placing: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

F. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

2. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

G. Hot-Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in

concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.

4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Architect.

3.9 FINISH OF FORMED SURFACES:

A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

3.10 MONOLITHIC SLAB FINISHES:

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

1. After placing slabs, plane surface to tolerances for floor flatness (Ff) of 15 and floor levelness (Fl) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat

surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.

1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - Fl 17. Grind smooth surface defects that would telegraph through applied floor covering system.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. Nonslip Broom Finish: Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

F. Nonslip Aggregate Finish: Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.

1. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.

2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

G. Colored Wear-Resistant Finish: Provide colored wear-resistant finish to monolithic slab surface indicated.

1. Apply dry shake materials for colored wear-resistant finish at rate of 100 lbs. per 100 sq. ft., unless greater amount is recommended by material manufacturer.

2. Cast a trial slab approximately 10 feet square to determine actual application rate, color, and finish, as acceptable to Architect.

3. Immediately following first floating operation, uniformly distribute with mechanical spreader approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material

with overlapping applications to ensure uniform color, and embed by power floating.

4. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer. Apply curing compound immediately after final finishing.

3.11 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

D. Provide moisture curing by following methods.

1. Keep concrete surface continuously wet by covering with water.

2. Use continuous water-fog spray.

3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.

E. Provide moisture-cover curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

F. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:

1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete. Architect to approve use where application of liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials are to be applied.

G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.

I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

J. Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.12 REMOVAL OF FORMS:

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

3.13 REUSE OF FORMS:

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid

offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS:

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and

foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

3.15 CONCRETE SURFACE REPAIRS:

A. General: No surface shall be patched or repaired until the Architect has reviewed the defective condition and approved the Contractor's submitted repair and/or patching materials and procedures.

B. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.

2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

D. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.

1. Repair finished unformed surfaces that contain defects that affect durability of concrete.

Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and

other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, when acceptable to Architect by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method when acceptable to Architect. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

F. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of Architect.

3.16 END OF SECTION 03300.

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 structural precast concrete units, including the following:

1. Hollow-core slab units.

B. Related Sections: The following sections contain requirements that relate to this Section.

C. Cast-in-place concrete is specified in Division 3 Section "Cast-in-Place Concrete."

D. Joint sealants and backing are specified in Division 7 Section "Joint Sealants."

E. Applied finishes are specified in Division 9 Sections.

1.3 SUBMITTALS:

A General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data and instructions for manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required.

C. Mix design reports of proposed concrete mix as specified in Part 2 of this Section.

D. Shop drawings prepared by or under the supervision of a qualified professional engineer, showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross-section; location, size, and type of reinforcement, including special reinforcement; and lifting devices necessary for handling and erection.

1. Indicate layout and dimensions, and identify each precast concrete unit corresponding to sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.

2. Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates, if required, for accurate placement.

E. Samples of bearing pads.

F. Test reports as required by provisions of this Section.

1.4 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except as otherwise indicated:

1. ACI 301, "Specifications for Structural Concrete for Buildings."

2. ACI 318, "Building Code Requirements for Reinforced Concrete."

3. AWS D1.1, "Structural Welding Code: Steel."

4. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

5. Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products."

B. Fabricator Qualifications: Firm experienced in fabrication of precast concrete units similar to units required for this Project and that have a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in work.

1. Fabricator must be a producer member of the Prestressed Concrete Institute (PCI) and/or participate in its Plant Certification Program.

C. Design by Fabricator: Design precast slab units to support superimposed dead loads including the weight of masonry partition walls, and live loads as indicated on drawings and as required for compliance with local governing code requirements.

D. Fabrication Qualifications: Produce precast concrete units at fabricating plant engaged primarily in manufacturing of similar units, unless plant fabrication or delivery to Project site is impractical.

1. If units are not produced at precast concrete fabricating plant, maintain procedures and conditions for quality control that are equivalent to plant production.

E. Fire-Resistance Rated Precast Units: Where precast concrete units are shown or scheduled as requiring fire-resistance classification, provide units tested and listed by Underwriters Laboratories, Inc. (UL) in "Fire Resistance Directory", or with each unit bearing UL label and marking.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver the amount of precast concrete units needed in a timely manner to the Project site to ensure installation continuity.

B. Store and handle the units at the Project site to prevent cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.

C. Deliver anchorage items that are to be embedded in other construction before starting such work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 FORMWORK:

A. Provide forms and, where required, form facing materials of metal, plastic, wood, or another acceptable material that is nonreactive with concrete and will produce required finish

surfaces.

B. Accurately construct forms, mortar-tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and for prestressed, pre-tensioning, and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified in PCI MNL 116.

1. Unless forms for plant-manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or movement during detensioning.

C. Provide finish as directed by architects drawings for all exposed to view precast concrete beams and lintels. At a minimum the finish shall be rubbed smooth free of any pin holes and or honeycomb surfaces. Surface shall be of uniform color, texture and appearance. Provide all revels in formwork as necessary to reproduce the visual lines shown on the architectural drawings. Do not attempt to tool or install reveals after beams have been cast.

2.2 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Reinforcement: ASTM A185.

D. Welded Deformed Steel Wire reinforcement: ASTM A 497.

E. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.

1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are protected with plastic (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 PRESTRESSING TENDONS:

A. Uncoated, 7-wire, stress-relieved strand complying with ASTM A 416. Use Grade 250 unless Grade 270 is indicated.

1. A strand similar to above, but having the size and ultimate strength of wires increased so that the ultimate strength of the strand is increased approximately 15 percent, or a strand with increased strength but fewer number of wires per strand, may be used at manufacturer's option.

2.4 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I or Type III.

B. Aggregates: ASTM C 33, and as specified here. Provide aggregates from a single source for exposed concrete.

1. Local aggregates not complying with ASTM C 33, but that have shown by special test or actual service to produce concrete of adequate strength and durability, may

be used when acceptable to Architect.

C. Lightweight Aggregate: ASTM C 330.

D. Water: Potable.

E. Admixtures, General: Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

G. Water-Reducing Admixture: ASTM C 494, Type A, or other Type approved for fabricator's units.

2.5 CONNECTION MATERIALS:

A. Steel Plates: Structural quality, hot-rolled carbon steel, ASTM A 283, Grade C.

B. Steel Shapes: ASTM A 36.

C. Anchor Bolts: ASTM A 307, low-carbon steel bolts, regular hexagon nuts, and carbon steel washers.

D. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, and hardened washers complying with ASTM A 325.

E. Finish of Steel Units: Exposed units galvanized per ASTM A 153; others painted with rust-inhibitive primer.

F. Bearing Pads: Provide bearing pads for precast concrete units as indicated on drawings.

1. Random oriented fiber reinforced material capable of supporting a compressive stress of 3000 psi with no cracking splitting or delamination.

G. Welding Electrodes: Comply with AWS standards.

H. Accessories: Provide clips, hangers, and other accessories required to install project units and to support subsequent construction or finishes.

2.6 GROUT MATERIALS:

A. Cement Grout: Portland cement, ASTM C 150 (Type I), and clean, natural sand, ASTM C 404. Mix at ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

B. Metallic Shrinkage-Resistant Grout: Premixed, factory-packaged ferrous aggregate grouting compound complying with ASTM C 1107, Grade B, with fluid consistency and a 30-minute working time.

C. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with ASTM C 1107, Grade B, with fluid consistency and a 30-minute working time.

D. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:

1. Metallic Shrinkage-Resistant Grout:

a. 100 Non-Shrink Grout (Metallic), Conspec, Inc.
b. Firmix, Euclid Chemical Co.
c. Vibra-Foil, W.R. Grace.
d. Ferrogrout, L & M Construction Chemicals, Inc.
e. Embeco 885, Master Builders.
f. Portalico, Protex Industries, Inc.
g. Kemox G, Sika Chemical.
h. Ferrolith G, Sonneborn/Rexnord.

2. Nonmetallic Shrinkage-Resistant Grout:

a. 100 Non-Shrink Grout (Non-Metallic), Conspec, Inc.
b. Supreme Grout, Cormix, Inc.
c. Sure Grip Grout, Dayton Superior.
d. Euco N.S., Euclid Chemical Co.
e. Crystex, L & M Construction Chemicals.
f. Masterflow 928, Master Builders, inc.
g. Sealtight 588 Grout, W.R. Meadows.
h. Propak, Protex Industries, Inc.
i. Set Non-Shrink, Set Products, Inc.
j. Stoncrete NM1, Stonhard, Inc.
k. Multi-Purpose Grout, Symons Corp.
l. Portland Expanding Grout (Non-Shrink), Target Products, Ltd.
m. Five Star Grout, U.S. Grout Corp.

2.7 MIX PROPORTION AND DESIGN:

A. Prepare design mixes for each type of concrete required.

B. Design mixes may be prepared by independent testing facility or by qualified precast manufacturing plant personnel at precast fabricator's option.

C. Proportion mixes by either laboratory trial batch or field experience methods using materials to be employed on the Project for each type of concrete required complying with ACI 318.

1. Produce standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:

a. Compressive strength -- 5000 psi minimum at 28 days.

b. Release strength for prestressed units -- 3500 psi.

2. Produce lightweight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:

a. Compressive strength -- 5000 psi minimum at 28 days.

b. Air-dry density -- not less than 90 nor more than 115 lb per cu. ft.

c. Release strength for prestressed units -- 3500 psi.

3. Cure compression test cylinders using same methods as for precast concrete work.

D. Submit written reports to Architect of proposed mix for each type of concrete at least 15 days prior to start of precast unit production. Do not begin concrete production until mixes and evaluations have been reviewed by Architect.

E. Adjusting Concrete Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test date for revised mix designs and strength results must be submitted to and accepted by Architect before using in the Work.

F. Admixtures: Use air-entraining admixture in concrete, unless otherwise indicated.

1. Use water-reducing admixtures in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Architect's acceptance.

2. Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

2.8 FABRICATION:

A. General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116 and as specified for types of units required.

B. Job-Site Casting: Use ready-mix concrete for units produced at a location other than the precast concrete fabricating plant complying with ASTM C 94.

C. Ready-Mixed Concrete: Comply with requirements of ASTM C 94 and as specified here.

1. Delete references for allowing additional water to be added to the batch for material with insufficient slump. Adding water to the batch is not permitted.

D. A shorter mixing time than that specified in ASTM C 94 may be required during hot weather or under conditions contributing to rapidly setting concrete.

1. When the air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

E. Built-in Anchorages: Accurately position built-in anchorage devices and secure to formwork. Locate anchorages where they do not affect the position of the main reinforcement or placing of concrete. Do not relocate bearing plates in units unless acceptable to Architect.

F. Cast-in openings larger than 10 inches in diameter or 10 inches square in accordance with final shop drawings. Other smaller holes may be field cut by trades requiring them, as acceptable to Architect.

G. Coat surfaces of forms with bond-breaking compound before reinforcement is placed.

Provide commercial formula form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces, and that will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.

H. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.

I. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers and hangers, as required.

J. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

K. Pre-tension tendons for prestressed concrete either by single-strand tensioning method or multiple-strand tensioning method. Comply with PCI MNL-116 requirements.

L. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items.

M. Identify pick-up points and orientation in structure with permanent markings, complying with markings indicated on final shop drawings. Imprint casting date on each precast unit on a surface that will not show in the finished structure.

N. Cure by low-pressure steam, steam vapor, radiant heat and moisture, or another similar process to accelerate concrete hardening and to reduce curing time.

O. Delay detensioning prestressed concrete units until concrete has attained at least 70 percent of the design stress, as established by test cylinders.

1. If concrete has been heat-cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.

2. Detension pre-tensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.

P. Finish formed surfaces of precast concrete as indicated for each type of unit, and as follows:

1. Standard Finish: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal color variations, and form joint marks, and minor chips and spalls will be tolerated. Major or unsightly imperfections, honeycombs, or structural defects are not permitted.

2. Commercial Finish: Remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces are to be true, well-defined surfaces.

3. Architecturally Exposed Finish: Provide finish as directed by architects drawings for all exposed to view precast concrete beams and lintels. At a minimum the finish shall be rubbed smooth free of any pin holes and or honeycomb surfaces. Surface

shall be of uniform color, texture and appearance. Provide all revels in formwork as necessary to reproduce the visual lines shown on the architectural drawings. Do not attempt to tool or install reveals after beams have been cast unless approved by the architect.

Q. Finish unformed surfaces by trowel unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

1. Apply scratch finish to precast concrete units that will receive concrete topping after installation. Following initial strikeoff, transversely scarify surface to provide ridges approximately 1/4 inch deep.

2.9 HOLLOW CORE SLAB UNITS:

A. Type: Precast, prestressed concrete units with open voids running full length of slabs.

B. Furnish units that are free of voids or honeycomb, with straight true edges and surfaces.

C. Provide standard finish units unless otherwise indicated.

D. Fabricate units of concrete materials that will provide a minimum 3500 psi compressive strength at the time of initial prestress and a 28-day compressive strength of 5000 psi.

E. Adequately reinforce slab units to resist transportation and handling stresses.

F. Include cast-in weld plates where required for anchorage or lateral bracing to structural steel members.

G. Coordinate with other trades for installation of items to be cast-in hollow slab units.

H. Provide solid, monolithic, precast slab units indicated to be an integral part of the hollow slab unit system. Design and fabricate solid units to dimensions and details indicated as specified for hollow slab units.

I. Provide headers of cast-in-place concrete or structural steel shapes for openings larger than one slab width in accordance with hollow slab unit manufacturer's recommendations.

2.10 SOURCE QUALITY CONTROL:

A. The Owner may employ an independent testing agency to evaluate precast manufacturer's quality control and testing methods.

B. The precast manufacturer shall allow Owner's testing agency access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

C. Dimensional Tolerances: Units having dimensions smaller or greater than required and outside specified tolerance limits may be subject to additional testing as specified here.

D. Precast units having dimensions greater than required will be rejected if the appearance or function of the structure is adversely affected or if larger dimensions interfere with other construction. Repair or remove and replace rejected units, as required, to meet construction conditions.

E. Strength of precast concrete units will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements that may affect the strength of the precast units, including the following conditions:

1. Failure to meet compressive strength tests requirements.

2. Reinforcement, and pre-tensioning and detensioning tendons of prestressed concrete not conforming to specified fabrication requirements.

3. Concrete curing, and protection of precast units against extremes in temperature not as specified.

4. Precast units damaged during handling and erection.

F. Testing Precast Units: When there is evidence that the strength of precast concrete units may not meet specification requirements, the Owner's testing laboratory will take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:

1. Take at least three representative cores from precast units of suspect strength, from locations directed by Architect.

2. Test cores in a saturated-surface-dry condition per ACI 318 if concrete will be wet when using completed structure.

3. Test cores in an air-dry condition per ACI 318 if concrete will be dry when using completed structure.

4. Strength of concrete for each series of cores will be considered satisfactory if the average compressive strength is at least 85 percent of 28-day design compressive strength.

5. Test results will be made in writing on the same day that tests are made, with copies to Architect, Contractor, and precast manufacturer. Include in the test reports the Project identification name and number, date, name of precast concrete manufacturer, name of concrete testing laboratory; identification letter, name, and type of member or members represented by core tests; design compressive strength, compressive breaking strength and type of break (corrected for length-diameter ratio), and direction of applied load to core with respect to horizontal plane of concrete as placed.

G. Patching: Where core test results are satisfactory and precast concrete units are acceptable for use in Work, solidly fill core holes with patching mortar and finish to match adjacent concrete surfaces.

H. Defective Work: Remove precast concrete units that do not conform to specified requirements, including strength, tolerances, and finishes. Replace with precast concrete units that meet requirements of this section.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:

A. Bearing Pads: Install flexible bearing pads where indicated as precast concrete units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.

B. Welding: Perform welding in compliance with AWS D1.1 and D1.4, including qualification of welders.

1. Protect units from damage by field welding or cutting operations and provide non-combustible shield as required.

2. Repair damaged metal surfaces by cleaning and applying a coat of galvanizing repair compound to galvanized surfaces and a compatible primer to painted surfaces.

C. Powder-Actuated Fasteners: Do not use powder-actuated fasteners for attaching accessory items to the surface of a precast, prestressed unit unless otherwise accepted by precast manufacturer.

D. Erection Tolerances: Install precast units without exceeding tolerance limits of PCI MNL-127, "Recommended Practice for Erection of Precast Concrete."

1. Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at connection and joints as follows:

a. Cement grout consisting of 1 part portland cement, 2-1/2 parts sand, and only enough water to properly mix and hydrate.

b. Shrinkage-resistant grout consisting of premixed compound and water to provide a flowable mixture without segregation or bleeding.

c. Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

END OF SECTION 03410.

1.0 - GENERAL

1.1 Scope

A. Furnish and install all Architectural Precast Concrete as indicated on the drawings and herein specified.

1.2 Submittals

A. Submit shop drawings for approval.

B. Shop drawings shall show fabrication details, layout plan, connection and anchorage details not indicated on the architect's drawings, and member identification marks. The identification marks shall appear on manufactured units to facilitate correct field placement.

1.3 Qualifications

A. The concrete products covered by this specification and shown on the drawings shall be equal quality, strength, appearance, texture, design, shape and dimensions of that manufactured by Miller Precast Company, or pre-approved equal.

B. Architectural Precast Concrete shall be reinforced, capable of supporting tensile loads and be manufactured according to standards of wet cast process. **Dry cast products (such as Cast Stone) shall not be acceptable.**

C. The latest edition of the following specifications, standards and codes shall govern with modifications as specified herein:

1. American Concrete Institute:
   ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   ACI 318 - Building Code Requirements for Reinforced Concrete.
   ACI 347 - Recommended practice for Concrete Formwork.

2. American Welding Society:
   AWS D1.0 - Code for Welding in Building Construction.
   AWS D3.0 - Standard Qualification Procedure.
   AWS D12.1 - Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

3. Industrial Fasteners Institute:
   Handbook on Fastener Standards.

2.0 - PRODUCTS

2.1 Materials

Materials shall be as outlined in ACI 318 - Building Code Requirements for Reinforced Concrete and the AISC Manual of Steel Construction.

2.2 Design

A. All concrete products shall be designed to support the dead and live loads in accordance with the International Building Code.

B. Proposed design shall be supported by complete calculations and drawings, and shall have the architect's approval.

C. All reinforcing, connection, bearing and fitting details shown on the drawings indicate the intent. The concrete manufacturer shall be responsible for all detail connections and design thereof. Provide all materials required.

2.3 Finish

A. Surface textures shall be with scored markings as selected by the Architect.

B. All standard shaped concrete products shall be cast in steel, fiberglass, or concrete molds. Special shaped products may be cast in accurately constructed forms with smooth interior surfaces of plastic coated wood, Masonite or similar materials.

C. Formed surfaces of concrete products shall be plant finish with an Architectural Grade a Finish. All air pockets and holes larger than 1/4" shall be filled with a sand-cement paste. All form offsets or fins shall be ground smooth.

D. All surfaces of concrete shall be clean and uniform for acceptable exposed finish.

2.4 Fasteners

A. The concrete manufacturer shall cast in structural inserts, bolts and plates as detailed on the contract drawings or required.

B. Hand drilled, power drilled, and power driven inserts and studs may be placed in concrete members. Power driven inserts and studs shall be located a minimum of 4" from concrete edges to eliminate spalling.

3.0 - EXECUTION

3.1 Installation

A. Concrete members shall be lifted and supported during manufacturing operations, stockpiling, transporting, and erection, only at the lifting and/or support points shown on the shop drawings.

B. All concrete members shall be erected into final position in the structure by the concrete manufacturer or by other competent erection personnel.

C. Erection shall be done with equipment, methods and personnel acceptable to the architect and manufacturer.

D. Erection shall be defined as including placing and leveling the members in final position in the structure on bearing surfaces prepared true to the line and grade under other items of the general contract.

E. Removal of lifting hook, if required.

END OF SECTION

1.0 - 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 unit masonry assemblies consisting of , but not limited to the following:

1. Concrete Masonry Units
2. Brick unit masonry
3. Mortar and Grout
4. Insulation in masonry walls

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Flashing and Sheet Metal" for exposed sheet-metal flashing installed in masonry
2. Division 7 Section-07910 - "Joint Sealants" for sealing joint in mockup
3. Division 7 - 07720 - Wall flashing
4. Division 7 - Section 07180 -Dampproofing
5. Division 8 - Section “FRP Doors”
6. Division 8 - Section 08110 -Hollow Metal Doors and Frames

C. Products installed but not furnished under this Section include the following:

1. Hot dip-galvanized Steel lintels for unit masonry
2. Wood nailers and blocking built into unit masonry
3. Manufactured reglets in masonry joints for metal flashing specified in Division 7 Section "Flashing and Sheet Metal."

1.3 Submittals

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each different masonry unit, accessory, and other manufactured product specified.

C. Samples for initial selection of the following:

1. Unit masonry samples in full size form showing the full range of colors and textures available for each different exposed masonry unit required.

D. Samples for verification of the following:

1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

a. Include size-variation data for Type FBS brick, verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances.
b. Weep holes/vents in color to match mortar color.

2. Accessories embedded in the masonry.

E. List of Materials Used in Construction Mockups: List generic names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

F. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
2. Each material and grade indicated for reinforcing bars.
3. Each type and size of joint reinforcing.
4. Each type and size of anchors, ties, and metal accessories.

G. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:

1. Mortar complying with property requirements of ASTM C 270.
2. Grout complying with property requirements of ASTM C 476.
3. Masonry units complying with property requirements of ASTM C90.

H. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 Quality Assurance

A. Clay Masonry Unit Test: For each clay masonry unit indicated, per ASTM C 67

B. Concrete Masonry Unit Test: For each different concrete mansory unit indicated, per ASTM C 140

C. Mortar Test: Test mortar properties per test methods of ASTM C 270

D. Evaluate mortar composition and properties per ASTM C 780

E. Grout Test: Test grout for compressive strength per ASTM C 1019

F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

G. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

H. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

I. Mockup: Prior to installing unit masonry, construct sample wall panel(s) to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

2. Locate mockups on site in the locations indicated or, if not indicated, as directed by Architect.
   a. Include exterior face brick wall with field and accent brick and a control joint.
   b. Seal control joint complying with Division 7 Section “Joint Sealants”.

3. Build mockups for the following types of masonry full thickness, including face and back-up wythes as well as accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
   a. Typical exterior face brick wall with through wall flashing installed for a 24 inch length in corner of mockup approximately 16” down from top of mockup with a 12 inch length of flashing left exposed to view (omit masonry above half of flashing).
   b. Typical interior masonry unit wall.
   c. Clean exposed faces of mockups with masonry cleaner "Sure Klean 600" or other masonry manufacturer approved cleaner.
   d. Protect accepted mockups from the elements with weather-resistant membrane.

4. Notify Architect one week in advance of the dates and times when mockups will be constructed.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
   a. Acceptance of mockup is for color, texture and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship and other material and construction qualities specifically approved by Architect in writing.
   b. Approval of mockups does not constitute approval of deviations from Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
   c. When directed, demolish and remove mockups from Project site.
   d. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 Special Inspections

Cooperate and adhere to the requirements of 2021 International Building Code - Special Inspections. All masonry and masonry reinforcing shall be subject to special inspections and

observations, at stage intervals deemed necessary, by the Owners' third party Inspector, Engineer and/or the Architect prior to grout filling.

1.6 Special Markings

A. The contractor shall chalk-line mark the floor slab for masonry wall locations.

B. The contractor shall mark on the floor slab location of reinforcing dowels to serve grouted cells so as to be clear as to locations of vertical cell reinforcement.

C. The contractor shall mark the concrete sub-floor with temporary marker paint to identify location of structural CMU reinforcing dowels so as to accurately locate reinforced cells during wall erection. Markings should be transferred to CMU surfaces as installation allows.

D. Prefabricated Corner and "T" Wall Reinforcing - upon arrival to the job site and while material is in bundle state, the ends shall be spray painted in the field with permanent bright red paint for easy recognition during site inspections.

1.7 Special Sequencing

A. After the special markings have been provided and prior to the start of CMU installation, an inspection of the concrete floor slab and CMU reinforcing dowels shall be required.

B. CMU wall construction designed to receive structural reinforcement and cell grouting shall be installed in such sequencing as to consolidate the work of placing reinforcement and cell grouting to minimum concentrate intervals encompassing such significant quantities as to warrant truck delivery of ready-mixed grout.

C. The work event of placing structural reinforcement and grouting shall require continuous special observation by the Owner's third party Inspector(s) as required by the 2021 International Building Code. Grout mix samples shall be required for testing purposes. The General Contractor shall directly schedule special masonry observations at least 24 hours in advance and notify Architect accordingly. Cost associated with special sequencing shall be considered and included in base bid.

1.8 Delivery, Storage, and Handling

A. Store masonry units on elevated platforms, 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 install until they are in an air-dried condition.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 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.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F

2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:

a. 40 to 25 deg F : Cover masonry with a weather-resistant membrane for 48 hours after construction.
b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.

3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

2.0 - PRODUCTS

2.1 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Brick:
   a. Acme Brick Co.
   b. Belden Brick Co.
   c. Cherokee Sanford Group, Inc.
   d. US Brick
   e. Boren
   f. Triangle
   g. Boral
   h. Tri-State

2. Portland Cement, Mortar Cement, Masonry Cement, and Lime:
   a. Essroc Materials, Inc.
   b. Glen-Gery Corporation
   c. Lafarge Corporation

3. Joint Reinforcement, Ties, and Anchors:
   a. Dur-O-Wal, Inc.
   b. Heckman Building Products, Inc.
   c. Hohmann & Barnard, Inc.
   d. Wire-Bond

2.2 Concrete Masonry Units

A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

2. Bullnose units are required for all outside corners of vertical surfaces, unless otherwise indicated.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,000 psi.
2. Weight Classification: **NORMAL**
3. Aggregates: Do not use aggregate made from pumice, scoria or tuff.
4. Provide Type N-I moisture-controlled units
5. Size: Manufactured to the actual dimensions indicated on Drawings within tolerances specified in the applicable referenced ASTM specification. Typical unit 8” nominal, 6” nominal, 4" nominal, or 12" nominal as indicated on drawings.

C. Custom Textured and Color Concrete Masonry Split Face Units

Units shall be made with either white marble or white limestone to meet ASTM C - 90-90 Type I. Units shall be of size as indicated and/or as required and shall be laid in stack bond. Furnish all necessary halves, flush ends, and specials. Face detail shall be as indicated on drawings and details.

2.3 Brick

A. General: Provide shapes indicated and as follows for each form of brick required.

1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes and lintels.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: ASTM C 216 and as follows:

1. Grade and Unit Compressive Strength: Provide units with grade and minimum average net-area compressive strength indicated below:
   a. Grade: SW. With color through brick to match existing school brick predominant on buildings in the school complex or as otherwise selected by the architect.
2. Type: FBS. With color through brick as selected by the architect.
3. Size: Bricks manufactured to the following actual dimensions within tolerances specified in ASTM C 216:
   a. Standard: 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long.
4. Application: Use where brick is exposed, unless otherwise indicated.
5. Color and Texture: As selected by the architect.

D. Brick Schedule
1. Contractor to provide an allowance (materials only) for the brick. See Section 01020 – Allowances.

2.4 Mortar and Grout Materials

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Masonry Cement: ASTM C91

C. Hydrated Lime: ASTM C 207, Type S (for CMU) Type N (for face brick).

D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

E. 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.

1. White-Mortar Aggregates: Natural white sand and or ground white stone.

F. Aggregate for Grout: ASTM C 404.

G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

H. Cold Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C; and recommended by the manufacturer for use in masonry mortar of composition indicated.

I. 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 1142.

J. Water: Potable.

K. Products: Subject to compliance with requirements, provide one of the following:

1. Cold Weather Admixture:
   a. “Accelguard 80”; Euclid Chemical Co.
   b. “Morset”; W. R. Grace & Co.

2. Mortar shall be approved equal to Lafarge as selected by Architect from full range of mortar colors available.

2.5 Ties and Anchors, General

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of this Article, unless otherwise indicated. Provide ties that will extend into the brick veneer a minimum of one half of the veneer width.

B. Wire: As follows:
1. Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating for wire ties and anchors in exterior walls.
2. Wire Diameter: 0.1875 inch.

2.6 Bent Wire Ties and Cornices

A. Individual units prefabricated from bent wire to comply with requirements indicated below:

1. Type for Masonry where Whythes are of Different Material: Adjustable ties composed of 2 parts; 1 with pintles, the other with eyes; with maximum misalignment of 1-1/4 inches. Ties shall be long enough to extend through rigid wall insulation and into outer wythe a minimum of 2 inches.

B. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.
2. Ladder design with cross rods spaced not more than 16" o.c. One side rod for each face shell of concrete masonry back-up and one rod for brick wythe.
3. Wire Size: 0.1875" diameter for deformed rods; No. 9 cross rods.
Hot dipped galvanized, Class 3. H. Reinforcing:

4. Brick to block ties: 3/16" diameter adjustable double hook & eye; Hohmann & Barnard Lox-All Adjustable Eye-Wire, Dur-o-wall or equal.

2.7 Embedded Flashing Materials

A. Vinyl Flashing:

1. Thickness: 40 mil thick.
2. Application: Use where flashing is fully concealed in masonry

B. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

C. Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to the following:

1. Vinyl Flashing:
   a. Gibraltar
   b. Nervastral
   c. AFCO

2.8 Single-Wythe CMU Flashing

Single-Wythe Concrete Masonry Unit Drainage System: BlockFlash™
Install CMU cell flashing pans with built in adjoining bridge made from recycled polypropylene with chemical stabilizers that prevent UV degradation. Flashing pans have a sloped design to direct moisture to the integrated weep spout. Designed to be built into mortar bed joints to expel moisture (unimpeded by mortar droppings) to the exterior of CMU walls. Drainage Mats and Insect Guards included. Product: Subject to compliance with requirements, provide "BlockFlash™" as manufactured by Mortar Net Solutions.

2.9 Miscellaneous Masonry Accessories

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from Neoprene.

B. Preformed Metal Control-Joints: Heckman 16 oz. copper – Type 93U, designed to fit brick size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep Holes: Provide the following:

1. Wicking material: Cotton sash cord in length required to produce 2 inch exposure on exterior and 18 inches in cavity between wythes.

E. Sealer for Brick: Prosoco-Siloxane-Weather Seal

F. Rebar Positioners: 3/16" diameter, hot-dipped galvanized and provided at 48" vertical centers in each reinforced cell.

2.10 Wall Reinforcement and Anchors

A. Continuous wall reinforcement at 16" o.c. for all masonry walls shall be hot-dipped galvanized and of either truss or ladder design with tabs for exterior two Wythe walls. Reinforcement shall have not less than No. 9 steel wire cross rods and No. 9 deformed side rods. Wires shall conform to ASTM A82. Reinforcement shall have

a drip when used in cavity walls, use rectangular pintle sections 16" o.c. in back-up masonry and adjustable double eyelet sections in face brick where rigid insulation is indicated or required in cavity space or where face brick and back-up masonry is not run up together. Use manufacturer's pre-formed corners and intersecting sections and splice as recommended. Basis of material selection shall be Hohmann & Barnard #270 or approved equals by Heckmann Building Products, Wire Bond and Dur-O-Wall.

2.11 Masonry Cleaners

A. Job Mixed Detergent Solution: Solution of ½ cup dry measure tetrasodium polyphosphate and 1/2 cup dry measure laundry detergent dissolved in 1 gallon of water.

B. Proprietary Detergent Solution: Manufacturer's standard strength cleaner designed for removing mortar/grout stains, efflorescence and other new construction stains from new masonry surfaces as acceptable to masonry material manufacturer. "Sure Klean" No. 600 Detergent; ProSoCo, Inc., or approved equal. Do not use acid cleaners.

2.12 Mortar and Grout Mixes

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

1. Limit cementitious materials in mortar to portland cement-lime.

2. Use Type S or N mortar.

D. Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1-to-10, by weight.

E. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and non-reinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Grout to have minimum 2,500 psi compressive strength at 28 days when tested in accordance with ASTM C1019.

1. Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.
2. Use coarse grout in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

3.0 - EXECUTION

3.1 Examination

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
2. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.2 General

A. Lay out all masonry work according to the dimensions shown on the drawings. No work shall be laid unless the temperature is 35° F. and rising.

B. All masonry work shall be laid straight, level, plumb, and true. Exterior walls shall be laid continuously around the entire structure and in no case racked up more than five (5) feet.

C. Build in all flashing, anchors, reinforcing, inserts, wall plugs, lintels, bearing plates, bond beams and items as required to accommodate the work of others.

D. All special details such as chases, openings, expansion joints, projections, corbels, etc., shall be built as required and/or indicated on the drawings.

E. Lay all masonry, brick and block in full bed of mortar completely filling all joints with mortar. Allow for caulking joints at all window and door frames, and at all wall intersections.

F. Joints of all exposed masonry surfaces shall be finished after the mortar has taken its initial set. Use a straight edge for horizontal joints. Vertical joints shall be in alignment from top to bottom.

G. At the end of each day or when rain or frost is imminent, the tops of masonry walls and similar surfaces shall be properly protected by covering top of wall with a strong waterproof membrane well secured in place.

H. Consult all other trades in advance and make provisions for the installation of their work to avoid cutting and patching. Do all cutting and patching of masonry required to accommodate work of others.

I. Unfinished work shall be stepped back to permit joining of new work. Masonry work may be toothed only when approved. Before connecting new work with work previously built, sweep clean, remove loose mortar and thoroughly wet the old brick.

J. As the work progresses, mortar daubs and smears shall be cleaned from masonry work.

K. Door frames shall be set before the masonry walls are built. As the masonry walls are built around these frames, the inside of the frames shall be grouted solid with mortar. NOTE: See HOLLOW METAL DOORS AND FRAMES - SECTION 08110 for requirements to coat interior of frames prior to grouting.

L. Extend all rated walls to the underside of structural deck above unless otherwise approved. Fit walls neatly with all joints filled where two levels of ceiling occur, extend walls to high level. Extend all partition walls to 8" above adjacent ceiling.

M. Weep holes: Provide weep holes in head joints 32" o.c. at thru wall flashing where air space is not open downward. Weep holes shall be below finish floor line and above finish grade.

N. MORTAR IN CONTACT WITH COPPER PIPING WILL NOT BE ACCEPTED. Coordinate with plumbing or mechanical contractor if copper is encountered without sleeving/insulation. Anticipate additional corrective work.

3.3 Installation, General

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.

C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.

D. 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 construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

3.4 Construction Tolerances

A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet , nor 1/2 inch maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.

C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet) or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.

E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch. Do not vary from collar-joint thickness indicated by more than minus 1/4 inch or plus 3/8 inch.

3.5 Laying Masonry Walls

A. Lay out 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 walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry:

1. Lay CMU in bond pattern to match existing.

D. Lay concealed masonry with all units in a wythe as above. 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. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

H. 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.

I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

J. Build non load-bearing interior partitions full height of story to underside of solid floor or roof structure above and as follows:

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Wedge non load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.6 Mortar Bedding and Jointing

A. Lay hollow concrete masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed all webs in mortar.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
4. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
5. Fill bottom course of all CMU solid with mortar.
6. Fill all courses of CMU adjacent to fill in area of ramp and stage solid with mortar.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.
1. Lay all brick with full head and bed joints.
2. At cavity walls, bevel beds away from cavity to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against cavity face of brick.
3. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 1/4-to-3/8-inch joints. Three brick courses and three mortar courses in 8-inch vertical to course with CMU.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

D. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.7 Structural Bonding of Multiwythe Masonry

A. Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties as shown, but not less than 1 metal tie for 4 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown. Provide continuity with horizontal joint reinforcing at corners by using prefabricated “L” units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space by providing continuity with horizontal joint reinforcing at corners by using prefabricated “T” units.

3.8 Cavities

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
2. Tie exterior wythe to back-up with individual metal ties. Stagger alternate courses.

3.9 Anchoring Masonry to Structural Members

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Space weldable rebar couplers at horizontal bond beams as indicated, but not more than 24 inches o.c. vertically.

3.10 Cavity Wall and Masonry Cell Insulation

A. On units of plastic board insulation, place small dabs of adhesive, spaced approximately 12 inches o.c. both ways on inside face or attach to inside face with plastic fasteners designed for his purpose. Verify compatibility of adhesive and bituminous damproofing specified in Division 7. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

B. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.11 Horizontal Joint Reinforcement

A. General: Provide continuous horizontal joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, ½" elsewhere. Lap reinforcing a minimum of 6 inches.

1. Space reinforcement not more than 16 inches vertically o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement in mortar joints 1 block course above and below wall openings and extending 12 inches beyond opening.
   a. Reinforcing above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

3.12 Control and Expansion Joints

A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the 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 by installing preformed control-joint gaskets designed to fit standard sash block.

C. Form expansion joints in brick made from clay or shale by forming an open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Maintain joint free and clear of mortar.

3.13 Lintels

A. Install steel lintels where indicated.

B. Provide pre-cast masonry lintels where shown and where openings of more than 12 inches for brick size units and 24 inches for block size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.14 Flashing, Weep Holes, and Vents

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer before covering with mortar.

C. Install flashing as follows:

1. At composite masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches and through the inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches unless otherwise indicated.
2. At lintels and shelf angles extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form a pan.
3. Flashing installation is to be inspected and approved in writing by Architect before proceeding with masonry work.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Form weep holes with product specified in Part 2 of this Section.
2. Form weep holes by keeping head joints free and clear of mortar.
3. Space weep holes 24 inches o.c.

E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

1. Install through-wall flashing and weep holes above horizontal blocking.

F. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.15 Grouting of CMU Walls

A. Contractor to notify Owner's Testing Agent prior to all grouting of steel reinforced CMU.

B. All cavities with steel reinforcing to be cleaned of all debris and broken CMU prior to filling with grout.

C. All reinforcing steel in cells to be filled with grout or concrete to be continuous with laps as required by code.

D. Grout for filled masonry cells is not to be dropped more than five (5) feet.

3.16 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; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised, using approved masonry cleaner.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.

E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.17 Sealing of Brick

A. Take precautions to avoid harm to building occupants, pedestrians, nearby property and all non-masonry surfaces from contact with sealer and fumes. Protect and/or divert auto and pedestrian traffic.

B. Test masonry (minimum 4 ft x 4 ft area) before overall application to assure compatibility and desired water repellent results. (Treated and cured masonry should shed water and not wet out.) Apply tests using the same equipment as for job application and allow to cure 24 to 48 hours. Test panels should remain available for inspection by Architect.

C. Surface Preparation:

1. Fill all cracks and voids to avoid penetration of fumes into the building. (Such openings may permit moisture, sealer or sealer fumes to penetrate wall.) Make sure that all caulks and sealants are in place and completely cured.
2. Clean dirt, oil and other contaminants from the surface. Use appropriate proprietary cleaners (do not use raw acids) where necessary. Rinse with pressure equipment at 500 to 1,500 psi to thoroughly remove all detergent residues. Do not apply to surfaces that are wet to the touch. Best results are obtained on dry surfaces. Internal moisture should also be dissipated.

3.18 Masonry Waste Disposal

A. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the project site.

END OF SECTION

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 fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.

2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

3. Refer to Division 3 for anchor bolt installation in concrete, Division 4 for anchor bolt installation in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Submit all shop drawings on three copies only unless specified otherwise in the general conditions. Two prints will be returned to the architect. All copies required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.

B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards). This data is submitted for information only.

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

2. High-strength bolts (each type), including nuts and washers.

a. Include Direct Tension Indicators if used.

3. Structural steel primer paint.

4. Shrinkage-resistant grout.

C. Shop drawings including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

3. Contract documents shall not be used for shop drawing, including erection plans or details.

4. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.

5. All structural steel connections not specifically detailed on the drawings shall be designed to resist forces indicated, by the Contractor.

D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category [**CASE**] [**CSE**].

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and holds the AISC Building QMS Certification (BU).
   a. Fabricator's not AISC-Certified may be used provided Owner's testing agency performs a shop special inspection of fabricators plant according to "Fabricator and Inspection Requirements for Steel Fabrication Shops Not AISC Certified" contained in Section 01410. Shop Special Inspection costs shall be borne by the Fabricator but contracted through the Owner.
   b. A qualified fabricator with at least one year experience in using Building Information Modeling (BIM) from inception to producing shop drawings.

C. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges", dated June 10, 1992.

   a. General: AISC "Code of Standard Practice" shall apply except to the extent that references are made to the responsibility of the Owner and/or Architect or Engineer in which event those references shall have no applicability. Where a conflict exists between the Code of Standard Practice and the Contract Documents, the Contract Documents shall govern.

2. AISC "Specifications for Structural Steel Buildings," including "Commentary".

3. AISC "Specifications for Structural Steel Buildings, Section 10, Architecturally Exposed Structural Steel".

4. "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Structural Connections.

5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."

6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If re-certification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor rods 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 by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.

1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel: ASTM A992, Grade 50 for wide flange beams; ASTM A36 elsewhere.

C. Cold-Formed Steel Tubing: ASTM A500, Grade B.

D. Hot-Formed Steel Tubing: ASTM A501.

E. Steel Pipe: ASTM A53, Type E or S, Grade B; or ASTM A501.

F. Moment Connection Material: Unless noted otherwise on the drawings, stiffener plates, doubler plates, gusset plates and the connecting plates shall be the same grade of steel as members being connected.

G. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.

H. Anchor Rods: ASTM A307 Grade A, headed type with supplementary requirements S1, unless otherwise indicated.

I. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.

J. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and

hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325.

    a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B695, Class 50, or hot-dip galvanized complying with ASTM A153.

2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A490.

K. Electrodes for Welding: Comply with AWS Code.

L. Structural Steel Primer Paint: Red oxide primer.

M. Cement Grout: Portland cement (ASTM C150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

N. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive,nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

    a. 100 Non-Shrink Grout (Non-Metallic); Conspec, Inc.
    b. Supreme Grout; Cormix, Inc.
    c. Sure Grip Grout; Dayton Superior.
    d. Euco N.S.; Euclid Chemical Co.
    e. Crystex; L & M Construction Chemicals, Inc.
    f. Masterflow 713; Master Builders.
    g. Sealtight 588 Grout; W. R. Meadows.
    h. Propak; Protex Industries, Inc.
    i. Set Non-Shrink; Set Products, Inc.
    j. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.

2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

1. Bolt field connections, except where welded connections or other connections are indicated.

    a. Provide high-strength threaded fasteners for all principal bolted connections, except

where unfinished bolts are indicated.

C. Simple Beam Connections: Standard double angle framed beam connections using bolts as specified.

1. Seated Beam Connections and Stiffened Seated Beam Connections shall not be used unless indicated on the drawings or unless Engineer approval is obtained to verify capacity of supporting member for the resulting eccentricity. The fabricator must verify and bear responsibility that the use of such connections does not interfere with Architectural or MEP requirements.

D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts."

E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

F. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

G. 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.

H. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.

1. Do not paint surfaces to be welded or high-strength bolted with slip-critical-type connections.

2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.

3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

A. General: Materials and fabrication procedures are subject to inspection and 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.

1. Promptly remove and replace materials or fabricated components that do not comply.

B. Design of Members and Connections: Details shown are typical; similar details apply

to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

A. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect.

B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

D. 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.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

2. 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.

3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

4. For proprietary grout materials, comply with manufacturer's instructions.

E. Field Assembly: Set structural frames 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.

F. Level and plumb individual members of structure within specified AISC tolerances.

G. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

H. Splice members only where indicated and accepted on shop drawings.

I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces. Each erection bolt on shop drawings shall be noted "Erection Bolt".

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2 QUALITY CONTROL

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category (CASE) (CSE).

B.

C. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and holds the AISC Building QMS Certification (BU).

D. Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

E. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

F. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

G. Testing agency may inspect structural steel at plant before shipment.

H. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

I. Field Inspections and

a. Tests:Check steel as received in the field for possible shipping damage workmanship, piece making and verification of required camber.

J. Shop-Bolted Connections:

a. Inspect or test in accordance with AISC specifications.

b. For bolted connections (bearing-type), all connections shall be visually observed to

assure that all bolts, nuts and washers are in place and that all plies of connection material have been drawn together. All bolts shall be verified to be snug tight only.

K. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

b. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.

c. Perform tests of welds as follows. Inspection procedures listed

i. Ultrasonic Inspection: ASTM E164. Perform on all full and partial penetration welds.

L. Field-Bolted Connections:

a. Inspect in accordance with AISC specifications.

b. For bolted connections (bearing-type), all connections shall be visually observed to assure that all bolts, nuts and washers are in place and that all plies of connection material have been drawn together. All bolts shall be verified to be snug tight only.

c. Bolts in slotted holes at expansion joints shall have nuts finger tight with threads damaged.

M. Field Welding: Inspect and test during erection of structural steel as follows:

a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

b. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.

c. Perform tests of welds as follows:

i. Ultrasonic Inspection: ASTM E164. Perform on all full and partial penetration welds.

END OF SECTION 05120.

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 steel joists for roof framing. Types of joists required include the following:

1. K-Series Open Web Steel Joists.

B. Refer to Division 3 Sections for installation of anchors set in concrete.

C. Refer to Division 4 Sections for installation of anchors set in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data and installation instructions for each type of joist and accessories.

1. Include manufacturer's certification that joists comply with SJI "Specifications" and SJI Plant certification.

C. Shop drawings showing layout of joist members, special connections, joining and accessories. Include mark, number, type, location and spacing of joists and bridging.

1. Provide templates or location drawings for installation of anchor rods and metal bearing plates.

D. Design Calculations: Submit for record one copy of design calculations, sealed by an engineer registered in the state where the project is located, for joist with cantilevers or concentrated loads or joist sizes for which standard load tables are not applicable.

1.4 QUALITY ASSURANCE

A. General: Provide joists fabricated in compliance with Steel Joist Institute (SJI) "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with American Welding Society (AWS) "Structural Welding Code - Steel," AWS D1.1.

C. Inspection: Inspect joists in accordance with SJI "Specifications."

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle steel joists as recommended in SJI "Specifications." Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI "Specifications" for chord and web sections.

B. Steel Bearing Plates: ASTM A 36.

C. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.

D. Steel Prime Paint: Comply with SJI "Specifications."

2.2 FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specification."

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended End: Provide extended ends on joists where indicated, complying with SJI "Specifications" and load tables.

D. Ceiling Extension: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.

E. Top Chord Extension: Provide top chord extensions ("R" type) on joists where indicated, complying with SJI "Specifications" and load tables.

F. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications."

1. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

G. End Anchorage: Provide end anchorages, including steel bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications."

H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

I. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

1. Apply one shop coat of steel prime paint to joists and accessories, by spraying, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.1 ERECTION

A. Place and secure steel joists in accordance with SJI "Specifications," final shop drawings, and as herein specified.

B. Anchors: Furnish anchor rods, steel bearing plates, and other devices to be built into concrete and masonry construction.

C. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

D. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

1. Where "open-web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

E. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

F. Fastening Joists: Comply with the following:

1. Field weld joists to supporting steel framework and steel bearing plates where indicated in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.

2. Bolt joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used.

a. Use unfinished threaded fasteners for bolted connections, unless otherwise indicated.

G. Touch-Up Painting: After joist installation, wire brush welded areas, abraded or rusty surfaces, and clean with solvent. Paint field-applied bolt heads and nuts and prepared surfaces on joists and steel supporting members. Use same type of paint as used for shop painting.

END OF SECTION 05220.

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 the following:

1. Roof deck.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
2. Division 09 painting Sections for repair painting of primed deck.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Submit all shop drawings on three copies only unless specified otherwise in the general conditions. Two prints will be returned to the architect. All copies required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.

B. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.

1. Provide test data for mechanical fasteners used fastening deck to supporting structures.

C. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

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."

PART 2 - PRODUCTS

2.1 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. Bowman Metal Deck Div., Cyclops Corp.
2. Consolidated Systems, Inc.
3. Epic Metals Corp.
4. Marlyn Steel Products, Inc.
5. H. H. Robertson Co.
6. Roll Form Products, Inc.
7. Roof Deck, Inc.
8. United Steel Deck, Inc.
9. Vulcraft Div., Nucor Corp.
10. Wheeling Corrugating Co.

2.2 MATERIALS

A. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications.

B. Miscellaneous Steel Shapes: ASTM A 36.

C. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

D. Galvanizing: ASTM A 525, G60.

E. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

2.3 PRODUCTS

A. ROOF DECK.
1. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

2. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade **33**, **G60** zinc coating.
3. Deck Profile: SEE PLAN
4. Profile Depth: SEE PLAN
5. Design Uncoated-Steel Thickness: SEE PLAN
6. Span Condition: Triple span or more.
7. Side Laps: Overlapped

.2.4 ACCESSORIES:

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

C. Mechanical Fasteners: Corrosion-resistant self-drilling, self-threading screws.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

F. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

2.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Locate mechanical fasteners and install according to deck manufacturer's written instructions, and these drawings and specifications.

2.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by mechanical fasteners:

1. Screw Diameter: #12 nominal.
2. Screw Spacing: SEE PLAN

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps as noted on drawings. Fasten perimeter edges of at intervals not exceeding 12” and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws or 5/8” diameter puddle welds as indicated on drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

2.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

F. Test all weld studs according to applicable standards.

2.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Design and or Build work of the following:

1. Exterior load-bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Roof trusses
    a. Gable-shaped trusses
    b. Piggyback Trusses.
4. Roof rafter framing.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

C. The extent of cold formed metal framing is shown on the drawings, including notes, elevations and details to show basic layout and location of members, typical connections, and type of steel required.

D. Section includes all work and supplementary items required to complete the proper installation of the pre-engineered cold formed metal framing as shown on the drawings and specified herein including headers, outriggers, supplemental rafters and incidental framing for a cold formed metal framing assembly within the extent shown on the drawings.

E. Cold formed metal framing includes planar structural units consisting of welded, screwed or bolted connected members which are fabricated, cut and assembled prior to delivery or at the job site.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated. Design bridging and other temporary and permanent bracing for same loads as used to design cold formed metal framing plus any temporary loads and permanent loads resulting laterally bracing of members.

1. Engineering Responsibility: Manufacturer’s responsibilities include using a qualified professional engineer to prepare structural analysis data for cold formed metal framing. All cold formed metal framing not specifically detailed on the drawings shall be designed to

resist forces indicated, by the Contractor, under the direct supervision of a professional engineer registered in the State where the project is located. Engineer/firm shall provide proof of professional liability insurance for said engineering responsibility.

a. Design calculations for the Cold formed metal framing designed by the Contractor shall be submitted for the files of the Architect and Engineer. Calculations shall bear the seal of a professional engineer registered in the State where the project is located. Shop drawings containing connections for which calculations have not been received will be returned unchecked as an incomplete submittal.

2. Design Loads: As follows:

   a. Dead Loads: Weights of materials and construction.
   b. Roof Live Loads: 20 PSF
   c. Wind Loads: As indicated in drawings.
   d. Seismic Loads: As indicated in drawings.
   e. Loads indicated on drawings plus concentrated loads hung from or supported on trusses. Refer to mechanical, electrical and plumbing drawings and specifications for loading information and location. Loading as required by other subcontractors, such as fire protection, shall be coordinated by the General Contractor.

3. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
   b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height.
   c. Roof Trusses: Vertical deflection of 1/240 of the span up to ¾ inch total dead load and ¾ inch total live load.
   d. Roof Rafter Framing: Horizontal deflection of 1/240 of the horizontally projected span up to ¾ inch total dead load and ¾ inch total live load.

4. 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 60 deg F (67 deg C).
5. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

   a. Upward and downward movement of 1/2 inch (13 mm).
6. Holes in Members: Design for holes in members where shown for securing other work to trusses; however, deduct area of holes from the area of chord when calculating strength of member.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

1.4 SUBMITTALS

A. This project is a 'Total Design and or Build' construction delivery system and review of submittals by the Owner or his representative does not relieve the 'Design and or Build' Contractor of design duties, construction responsibility or liability for improper design, function or performance. The review by Owner is not an independent design check of final plans and methods of construction by and will not in any way relive the 'Design and or Build' contractor of sole design and construction responsibility for the successful completion and long term stability of the work.

B. Product Data: For each type of cold-formed metal framing product and accessory indicated.

C. Shop Drawings: Show layout, spacing, sizes, thicknesses, pitch, span, camber 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. Shop drawings shall include all placement sequences and instructions.
   1. Submit all shop drawings on three copies only unless specified in the general conditions. Two prints will be returned to the architect. All other reproductions required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.
   2. Architect's and Engineer's Shop Drawing Review: Review of shop drawings will be for general considerations only. Compliance with requirements for materials, fabrication, engineering, dimensions, bracing, and erection is the Contractor's responsibility.
   3. If there are questions, clarifications, modifications, or other items where information, a response, or approval is requested, such items must be written on the cover sheet to the submittal. Only indicating such items on the shop drawings or within the calculations is not sufficient. Where items are not specifically listed on the cover sheet and subsequently explicitly approved by the Structural Engineer of Record, such items are not to be considered approved or considered.
   4. Submit design analysis and test reports indicating loading, section properties, allowable stress, stress diagrams and calculations, and similar information needed for analysis and to insure trusses comply with requirements.
   5. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation licensed to practice in the state where the project is located. Shop drawings which do not contain this information will be returned unchecked.
   6. Submittals shall additionally conform to the requirements shown on the General Notes of the project Structural Drawings.
   7. Provide permanent bracing drawings for the metal stud truss system. Permanent bracing shall be designed by the contractor under the direct supervision of the professionally registered engineer licensed in the state that the project is located. The permanent bracing shop drawings and calculations shall be submitted with the truss shop drawings and calculations. The permanent bracing and metal stud shop drawings are to be considered one submittal. If one is submitted without the other the submittal will be returned rejected.

D. Welding certificates.

E. Qualification Data: For professional engineer and testing agency.

F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

   1. Steel sheet.

2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

G. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

G. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 FABRICATOR'S QUALIFICATIONS

A. Cold formed metal framing shall be designed, fabricated, and erected by a firm which has a record including a minimum of five years of successfully designing, fabricating, and erecting cold formed metal framing assemblies similar to scope required and which practices a quality control program. Fabricators shall additionally be qualified with at least one year experience in using Building Information Modeling (BIM) from inception to producing shop drawings.

B. Fabricators who wish to qualify for approval under this Section of the specification shall submit evidence of compliance with this specification no later than ten (10) days prior to the bid date. Only those fabricators approved in writing by the Architect prior to the bid date will be accepted.

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.

C. Do not store materials on structure in a manner that might cause distortion or damage to supporting structures.

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:

B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. AllSteel Products, Inc.
2. California Expanded Metal Products Company.
3. Clark Steel Framing.
4. Dale/Incor.
5. Dietrich Metal Framing; a Worthington Industries Company.
6. Formetal Co. Inc. (The).
7. Innovative Steel Systems.
8. MarinoWare; a division of Ware Industries.
9. Southeastern Stud & Components, Inc.
10. Steel Construction Systems.
11. Steeler, Inc.
12. Super Stud Building Products, Inc.
13. United Metal Products, Inc.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: Minimum of Grade 33 or as required by structural performance.
2. Coating: G60 (Z180).

B. Steel Sheet for Vertical Deflection or Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50 (340), Class 1 or 2 or as required by structural performance.
2. Coating: G90 (Z275).

2.3 EXTERIOR LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
2. Minimum Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm) or matching steel studs.
2. Minimum Flange Width: 1-1/4 inches (32 mm).
3. Section Properties: as required by structural performance.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 18ga
2. Minimum Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

D. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: 18 ga
2. Top Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
2. Minimum Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 18 ga or matching steel studs.
2. Minimum Flange Width: 1-1/4 inches (32 mm)].
3. Section Properties: as required by structural performance.

C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dietrich Metal Framing; a Worthington Industries Company.
    b. MarinoWare, a division of Ware Industries.
    c. SCAFCO Corporation
    d. The Steel Network, Inc.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dietrich Metal Framing; a Worthington Industries Company.
    b. MarinoWare, a division of Ware Industries.
    c. SCAFCO Corporation
    d. The Steel Network, Inc.

3. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
4. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

E. Contractors' Option Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
    b. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
    b. Flange Width: outer deflection track flange width plus 1 inch (25 mm).

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.5 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard-shape steel sections, C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges. Proprietary shape trusses are

acceptable provided all engineering calculations are performed by the manufacturer or his agent.

1. Minimum Base-Metal Thickness: as required by structural performance..
2. Flange Width: as required by structural performance.
3. Section Properties: as required by structural performance.

2.6 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 18 ga.
2. Flange Width: 1-5/8 inches (41 mm) minimum.
3. Section Properties: as required by structural performance.

B. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section rafter track, with unstiffened flanges; unpunched; of web depths indicated; and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm) or Matching steel rafters.
2. Flange Width: 1-5/8 inches (41 mm, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Rafter hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

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 Anchors: 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: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or 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, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining 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.

D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.10 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying 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 according to Shop Drawings, with screw penetrating joined 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).

D. Cold formed metal framing to be fabricated at the fabricator's shop in the largest sections possible to transport and erect.

E. All cold formed metal framing shall be fabricated and erected in strict accordance with the current printed instructions of the approved subcontractor or fabricator.

F. All cold formed metal framing components shall be straight and true prior to fabrication. Flattening or straightening of components, when necessary, shall be accomplished in a manner so as to not damage the component.

G. All cold formed metal framing components shall be cut neatly to fit snugly against adjacent members.

H. No splices will be allowed in cold formed metal framing except as authorized in writing by the Architect or as shown on the approved shop drawings.

I. Framing components shall be field or shop fabricated and joined to one another by means of welding or through the use of screws.

J. Completed cold formed metal framing shall be free from twists, bends, or open joints with all members straight and true to line.

K. Welds must be thoroughly cleaned and wire brushed and primed and painted with a high zinc content paint capable of providing an equal or greater degree of protection than the original G-60 galvanized coating.

L. Bridging: Fabricate horizontal or diagonal type bridging for cold formed metal framing as required to prevent buckling of members where sheathing applied to the cold formed metal framing members is not present or is not adequate to brace the cold formed metal framing member. Bridging shall transfer all forces to the roof diaphragm.

M. End Anchorage: Fabricate end anchorages to secure cold formed metal framing to adjacent construction.

N. Fabricate all clips, angles, henways and other miscellaneous pieces necessary to attach cold formed metal framing to the substructure or to attach other components within this section to one another.

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.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Structural Adequacy: Contractor shall prepare the structure to insure proper and adequate structural support for the materials specified.

B. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

C. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

D. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or rafter locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

E. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or rafter locations.

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 AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying 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 according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads 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, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed rafters, 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 EXTERIOR LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: To match stud spacing.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm).

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. 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. Fasten jamb members together to uniformly distribute loads.
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 a minimum of 48 inches (1220 mm) apart or as required by structural performance. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING 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 indicated. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm).

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
4. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows but not more than 48 inches (1220 mm) apart or as required by structural performance. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

    a. Install solid blocking at 96-inch (2440-mm) centers.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

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 wall-framing system.

3.6 ROOF RAFTER INSTALLATION

A. Install perimeter rafter track sized to match rafters. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install rafter bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten rafters to both flanges of rafter track.

1. Install rafters over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
2. Reinforce ends and bearing points of rafters with web stiffeners, end clips, rafter hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space rafters not more than 2 inches (51 mm) from abutting walls, and as follows:

1. Rafter Spacing: 24 to 48 inches or as required by structural performance.

D. Frame openings with built-up rafter headers consisting of rafter and rafter track, nesting rafter, or another combination of connected rafters if indicated.

E. Install rafter reinforcement at interior supports with single, short length of rafter section located directly over interior support, with lapped rafters of equal length to rafter reinforcement.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals as required by structural performance Fasten bridging at each rafter intersection as follows:

1. Bridging: Rafter-track solid blocking of width and thickness indicated, secured to rafter webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and rafter-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of rafters and secure solid blocking to rafter webs.

G. Secure rafters to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous rafter framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable rafter-framing assembly.

3.7 TRUSS INSTALLATION

A. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.

B. Truss Spacing: 48 inches (1220 mm).

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 required by structural performance and designed according to LGSEA's Technical Note 551e, "Design Guide for Permanent Bracing of Cold-Formed Steel Trusses."

H. Trusses shall be braced against racking. Lifting of trusses shall be done so as to not cause local distortion in any member.

I. All trusses shall be erected using equipment of adequate capacity to safely perform the work.

J. The General Contractor is responsible for checking the dimensions and assuring the fit of all members and trusses before erection begins.

K. All work shall be erected plumb and level and to dimensions and spacings indicated on the drawings. Provide bridging and permanent bracing as shown in the shop drawings.

L. Assemblies shall be of the size and spacing shown on the approved shop drawings.

M. Provide web stiffeners and reinforcement at reaction points where required by analysis or to suit details.

N. Hoist units in place by means of lifting equipment suited to sizes and types of trusses required, applied at designated lift points as recommended by fabricator, exercising care not to damage truss members.

O. Provide temporary bracing as required to maintain trusses plumb, parallel and in location indicated, until permanent bracing is installed.

P. Anchor trusses securely at all bearing points to comply with methods and details indicated.

Q. Install permanent bracing and related components to enable trusses to maintain design spacing, withstand design loads, and comply with other indicated requirements.

R. Do not cut or remove truss members.

S. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

T. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening.

3.8 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports per Specification Section 01410.

B. Field and shop welds will be subject to testing and inspecting.

C. Provide Access for testing agency to places where truss work is being fabricated or produced so that required inspections, observations and testing can be accomplished.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Remove and replace work where test results indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

G. Architect reserves the right, at any time before final acceptance, to reject material not complying with specified requirements regardless of when testing agency completed inspection, observation or testing.

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. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05400

1.0 - GENERAL

1.1 Scope
Furnish and install all miscellaneous metals as indicated on drawings, including that shown only on Architectural Drawings, and/or as specified.

1.2 Submittals
Submit shop drawings for approvals.

1.3 Applicable Standards
Fabrication and erection, except as specified otherwise, shall be in accordance with American Institute of Steel Construction (AISC) Specifications for the Design, Fabrication and Erection of Structural Steel for Building.

1.4 Qualification
Manufacturer's names, models, or catalog numbers, referred to herein are intended to show the type, quality and intent of items required. Products of other manufacturers equal or better in quality, similar in design are acceptable subject to the Architect's approval.

1.5 Substitutions
Substitutions of sections or modifications of details shall be submitted with the shop drawings for approval. Approved substitutions, modifications, and necessary changes in related portions of the work shall be coordinated by the contractor and shall be accomplished as no additional cost.

2.0 - PRODUCTS

2.1 General Materials

A. Metals shall be free from defects impairing strength, durability, or appearance and of the best commercial quality for the purposes specified. All materials shall be new materials and shall have structural properties to sustain safely or withstand strains or stressed to which normally subjected. All exposed fastenings shall be of same material, color and finish as the metal to which applied unless otherwise shown.

B. Provide all accessories such as anchors, hangers, belts, toggle bolts, expansion bolts, rods, shelf angles, clip angles, shims, connections, stiffeners, reinforcements, screws, etc., required for proper complete fabrication, assembly and installation of all miscellaneous steel, metal work and masonry. Bolts, screws, expansion bolts, toggle bolts, etc, shall be brass, bronze, stainless steel or aluminum when used with these metals.

C. Steel lintels and miscellaneous structural shapes where called for shall be of shapes, lengths and weights, as shown and detailed on the drawings, spanning openings where so indicated, shall be complete with bolts, anchors, etc., for building in. Lintels shall not have less than eight (8") inch bearing upon masonry.

D. Galvanized steel shall be hot-dipped galvanized in accordance with the Standard Specifications of the American Hot-Dip Galvanizing Association. Galvanizing shall be done after fabrication.

E. All materials shall be well formed to shape and size with sharp lines. Conceal fasteners where practical. Thickness of metals and details of assembly and

supports shall give ample strength.

F. Welding shall conform to American Welding Society's Standard Code for Arc and Gas Welding in Building Construction. Welding shall be continuous along entire area of contact, except where tack welding is specifically shown or specified. Tack welding will not be permitted on exposed surface. Grind all exposed welds smooth.

2.2 Painting and Protective Coating

A. Thoroughly clean off all miscellaneous metal, using power tool cleaning to remove all dirt, grease, rust, and scale and foreign matter.

B. Treat only concealed galvanized metal with galvanized metal primer as per manufacturer's directions before painting. Exposed galvanized metal to be primed and finished under Painting Section.

C. Unless otherwise specified, paint all metal items, including concealed galvanized metal, one shop coat of Red or Grey oxide zinc chromate TT-P-636-C. Surfaces inaccessible after assembly shall be painted before assembly. Work paint thoroughly into joints, etc. Do not paint bronze, aluminum or stainless steel.

D. Insulate faces of all metals in contact with different metals, wood, masonry, and/or concrete; give each contact surface one coat approved alkali-resistant bituminous paint. Let both surfaces dry before installing metals.

2.3 Miscellaneous Metal Items

The following items are intended as a guide to such work in this project and do not necessarily limit the scope of this section.

A. All structural shapes indicated and/or required.

B. Miscellaneous Steel Lintels. Provide miscellaneous steel lintels indicated on Architectural and/or Structural Drawings or as required. All miscellaneous steel lintels are subject to structural engineer's review and approval.

C. Steel Stairs as indicated for 125 lb./sq./ft. live load capacity steel pan construction. Tread, riser, and landing pans of 14 ga. U.S.S. Stringers 10" channel at 8.4 lbs./ft. minimum or as indicated or required. Provide all channels, angles, closures, clips, anchors, as required. Cement fill 2" treads and 3" landings under Concrete Section. Prime under this Section.

D. Metal Ladders - Provide steel ladders where indicated of 3/8" x 2-1/2" steel bar stringers spaced 20" o.c. with 3/4" square bar rungs set at 45 degrees and welded to stringer 12" o.c. Anchor ladder to masonry with clip angles or bent plates designed to hold rungs 8" from wall. Space anchors not more than 5'-0" o.c. Prime paint under this Section. At each non-caged ladder over 14 ft. in height shall be provided with a climbing safety system equal to VI-GO Ladder Climbing Safety System as manufactured by Miller by Sperrian. (See Elevator Pit and Roof Access Ladders.)

E. Downspout Boots shall be equal to Jay R Smith MFG. Co. (Smith Industries) special downspout boots. Cast Iron Body with 3" Bronze Access Plug and Strap with 5/16" Dia. Cast Holes for flat head bolts, Typical. 5 x 4 Size.

F. Gutter Sidewalk Box shall be equal to McKinley Light Duty Type GBC with checker plate cover to Type GCG with grating. Cast iron asphalt coated, size and length as

required to match downspout sizes shown. Note - Boxes may be fabricated from steel tubing, galvanized after fabrication.

G. Catch Basin Cover shall be equal to McKinley Light Duty Type KL 24 x 24 or Type KGL 24 x 24 as indicated. Cast iron asphalt coated.

H. Stair Nosings-Treads for concrete filled steel pan stairs and concrete stairs on grade slab shall be equal to American Safety Tread Co., Helena, Alabama, Abrasive Cast Metal Nosing # 820, full width of stairs with anchor devices as recommended by the manufacturer.

I. Expansion Joint Systems (As Indicated and/or as required)

1. Floor to floor expansion joint system shall be flush type as approved equal to Model GFT - RFX as manufactured by C/S System Corporation or Model TMB Series as manufactured by Nystrom.
   a. Floor to floor expansion joints shall be provided with a 2 hr. fire barrier component as approved equal to ARe-Flex@, Between floor series as manufactured by C/S Systems Corporation.

2. Wall to Wall expansion joint system (As Indicated and/or as required)
   a. Shall be surface mount type as approved equal to Wall-to-Wall Joint Systems. Basis-of-Design Product: Construction Specialties, Inc. Model SFW. Type: Vertical cover plate. Exposed Metal: Aluminum. Finish: Class II, clear anodic.
   b. Fire-Resistance Rating: Provide joint system and fire-barrier assembly with a rating not less than that of adjacent construction. Typical: Wall to wall expansion joints shall be provided with a 2 hr. fire barrier component as approved equal to “Re-Flex” by Construction Services or “Pyro-Flex” by MM Systems Corporation.
   c. Moisture Barrier – Manufacturer’s Standard

3.0 - EXECUTION

3.1 Fabrication

A. Verify measurements in field for work fabricated to fit job conditions.

B. Fabricate form work true to detail with clean, straight, sharply defined profiles. Iron shall have smooth finished surfaces unless indicated otherwise. Shearing and punching shall leave clean, true lines and surfaces.

C. Fastenings shall be concealed where practical. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to the weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

D. Joints shall be rigid at adjoining sections for a strong assembly. Weld or rivet permanent connections. Welds shall be continuous and finished flush and smooth on surfaces that will be exposed after installation. Do not use screws or bolts where it can be avoided; where screws or bolts are used, the heads shall be countersunk, screwed up tight and threads nicked to prevent loosening. Unexposed welded joints may be continuous or spot welded as required. Remove weld spatter from adjacent surfaces.

3.2 Installation

A. Erect work in thorough, first class manner with mechanics experienced in the

erection of iron work.

B. Work shall be strong, secure, and adequate for the purpose intended.

C. Schedule delivery of items to be built into the masonry so as not to delay the progress of the work and to coordinate for proper installation.

D. Place and properly secure to form work items such as anchors, sleeves, and inserts which are to be cast in concrete.

END OF SECTION

1.0 – GENERAL

1.1 Section Includes
A. Roof edge protection.
B. Collapsible guard rails.
C. Self-closing safety gate.
D. Modular railing system.
E. Pipe fittings.

1.2 References
A. Occupational Safety & Health Administration (OSHA): 29 CFR 1910.23 - Guarding Floor and Wall Openings and Holes.
B. Occupational Safety & Health Administration (OSHA): 29 CFR 1910.27 - Fixed Ladders.
C. Occupational Safety & Health Administration (OSHA): 29 CFR 1926.500 - Scope, Application, And Definitions Applicable to this Subpart.
D. Occupational Safety & Health Administration (OSHA): 29 CFR 1926.501 - Duty to Have Fall Protection.
E. Occupational Safety & Health Administration (OSHA): 29 CFR 1926.502 - Fall Protection Systems Criteria and Practices.
F. Occupational Safety & Health Administration (OSHA): 29 CFR 1926.503 - Training Requirements.
G. Occupational Safety & Health Administration (OSHA): Warning Line Interpretations dated May 12, 2000, November 15, 2002, and January 3, 2005.

1.3 Submittals
A. Submit under provisions of Section 01350.
B. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
C. Shop Drawings: Drawings showing plans, elevations, sections and details of components.
D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.4 Delivery, Storage, And Handling
A. Deliver materials to the job site in good condition and adequately protected against damage as handrails are a finished product.
B. Inspect rail sections for damage before signing the receipt from the trucking company. Truck driver must note damaged goods on the bill of lading if damaged product is found.
C. Store products in manufacturer's unopened packaging until ready for installation.

1.5 Project Conditions
Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication.

1.6 Warranty
Warranty: Provide manufacturer's two (2) year warranty.

2.0 - PRODUCTS

2.1 Manufacturers

A. Acceptable Manufacturers: Bluewater Mfg., Inc. (Basis of Design)
Or 360 Mobile Safety Rail by EDGE Fall Protection.

B. Requests for substitutions will be considered in accordance with provisions of Section 01360 - Product Substitution.

2.2 Systems

A. Roof Edge Protection: Provide freestanding pedestrian egress barrier system on roof, including pipe railings, uprights, bases, and fittings.
   1. Approved Product: Safety Rail 2000.
   2. Standards: System shall have top and mid rail in accordance with OSHA Standards - 29 CFR 1910.23 (a)(2).
   3. Structural Load: 200 lb. (90.7 kg), minimum, in any direction to all components in accordance with OSHA Regulation 29 CFR 1926.502.
   4. Height: 42 inches (1067 mm), minimum.
   5. Railings: 1-5/8 inch (41 mm) O.D. hot rolled pickled electric weld tubing, free of sharp edges and snag points.
   6. Mounting Bases: Class 30 gray iron material cast with four receiver posts. Provide rubber pads on bottom of bases.
   7. Receiver Posts: Shall have a positive locking system into slots that allow rails to be mounted in any direction. Friction locking systems are not allowed. Receiver posts shall have drain holes.
   8. Accessories:
      a. Toe Board Brackets: Provide brackets and friction knobs as manufactured by Bluewater Mfg. 1nc.
      b. Step-Rail: Variable height railing enables a continuous run of Safety Rail 2000 when the roof steps up or down.
      c. Raised Mid-Rail: Railing to fit over duct work for continuous run of SafetyRail2000.
      d. LP Outrigger: Supports placed under ducting or conduit to continue run of Safety Rail 2000 when rail section cannot be used.
      e. SG2000: Sliding gate.
      f. Finishing Rail: D-shaped railing extension for ladder landings, length of rail section and D-loop as indicated on the Drawings.
   9. Hardware: Securing pins shall be 1010 carbon steel, zinc plated and yellow chromate dipped. Pins shall consist of collared pin and lanyard that connects to lynch pin.

B. Collapsible Guard Rails: Provide collapsible portable guard rail section with one-way pivot assembly that allows guardrail to fold down to horizontal surface for clean sightlines; requires no penetrations in substrates for installation. Rails shall be compatible with Safety Rail 2000 Guardrail System.
   1. Approved Product: Stealth Rail.
   2. Standards: Guard rail system shall meet or exceed OSHA (Standards - 29 CFR) 1926.501 and 1926.502.
   3. Hardware: Detent pin on each pivot assembly shall lock rail in upright position.

C. Self-Closing Safety Gate: Fully assembled gate shall be capable of swinging in either direction by inverting installation position. Gate size shall be laterally adjusted from minus 1-1/4 inch (32 mm) to plus 2-1/2 inch (64 mm).
   1. Approved Product: Self-Closing Safety Gate.
   2. Standards: System shall have top and mid rail in accordance with OSHA Standards - 29 CFR 1910.23 (a)(2).
   3. Width: As indicated on Drawings.
   4. Height:
      a. Top Rail: 42 inches (1067 mm), minimum.
      b. Bottom Rail: 21 inches (533 mm).

5. Hardware: Provide the following:
    a. Gate Hardware: U-Bolts.
    b. Universal Hinge Assembly: Fits railing types up to 2 inches (51 mm) O.D. or flat surface mounting.
    c. Railing adapter kit.
    d. Self-Closing Springs: Two stainless steel torsion springs.
6. Material: Mild steel, powder coated.
7. Material: Mild steel, hot-dip galvanized.
8. Material: Mild steel, hot-dip galvanized with powder-coated finish.
9. Material: Stainless steel.

2.3 Fittings

A. Pipe Fittings:
    1. Approved Product: Kwik-Fit.
    2. Type: Provide fittings required for a complete operational system that meets OSHA requirements.

2.4 Accessories

A. Safety/Caution Signage: Cushioned foam strip with self-adhesive backing; UL- rated for indoor/outdoor use.
    1. Approved Product: Safety Strip.
    2. Thickness: 3/8 inch (9.5 mm).
    3. Length: 36 inches (914 mm).
    4. Width: 2 inches (51 mm).
    5. Width: 4 inches (102 mm).
    6. Color: Safety yellow.
B. Roof Pads: Provide the following pad under each base to protect roof membrane.
    1. Approved Product: BUR Pad.
    2. Approved Product: EPDM Roof Pad.

2.5 Finishes

A. Finish: Factory finished powder coat paint.
B. Finish: Hot dipped galvanized.
C. Color: TBS.

2.6 Fabrication

Assemble components with joints tightly fitted and secured. Accurately form components to suit installation.

3.0 - EXECUTION

3.1 Examination

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 Preparation

Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 Installation

Install in accordance with manufacturer's instructions.

3.4 Protection

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

1.0 - GENERAL

1.1 Scope
The work under this section consists of all rough carpentry work.

1.2 General
A. Rough carpentry shall generally include all rough framing, furring, grounds, bucks, blocking and such other wood work as required.

B. Carpentry shall also include all temporary bracing, shoring and centering as required for the support or protection of the work.

1.3 Cooperation With Other Trades
The work under this section includes the necessary cutting and patching required for the proper installation of work of other trades. Work which is to be built in by others shall be accurately positioned and properly built in to secure the work of this section. Temporary centering, bracing and shoring shall be provided as required for the support and protection of masonry work during construction.

1.4 Delivery and Storage
Lumber and other materials specified herein shall be delivered, handled and stored in order to prevent damage and absorption of excess moisture. Lumber shall be stored in such a manner as to insure proper ventilation and protection from the weather.

2.0 - PRODUCTS

2.1 Lumber
A. All dimensional lumber used under this section shall be thoroughly dried No. 2 Southern Yellow Pine or No. 2 Douglas Fir of sizes, shapes and lengths required. Moisture content shall not exceed 19% at time of installation.

B. All wood shall be sound, flat, straight, well-seasoned, thoroughly dry and free from structural defects. Warped or twisted wood shall not be used.

C. Lumber grades shall conform to the grading rules of the manufacturer's association under whose rules the lumber is produced. All lumber shall be grade-marked.

2.2 Plywood
A. Each panel of softwood plywood shall be identified with the DFPA grade trademark of the American Plywood Association and shall meet the requirements of Product Standard PS 1-66 for Softwood Plywood Construction and Industrial. All plywood which has any edge or surface permanently exposed to the weather shall be of the exterior type.

B. Plywood sheathing and/or decking shall be DFPA Standard with exterior glue, thickness as shown on the drawings or required for the intended use. Square edge or tongue and groove as approved.

C. Plywood for roof decking shall be 3/4" minimum CDX with C grade up. Provide “H” clips at mid-span of edge joints.

2.3 Oriented Strand Board (OSB)
A. Shall be used for floor, wall and roof sheathing in light commercial construction applications as indicated. Each panel is third-party certified

for quality and is rated for Exposure 1 bond durability for protected applications and limited exposure during normal construction delays. OSB shall be edge coated to limit absorption and pick-up of moisture. OSB shall be equal to Georgia -Pacific Blue-Ribbon OSB.

2.4 Wood Treatment

A. Lumber in contact with concrete or masonry, including roof blocking, cants and nailers and/or as indicated, shall be pressure preservative treated in accordance with American Wood Preservers Institute Standard No. LP-2. Creosote, oil or similar materials which bleed shall not be used.

B. Lumber for blocking and furring, located within interior concealed spaces shall be non-combustible. Treatment shall be equal to "Flame-Proof" by Osmose Wood Preservative; "Non-Con" by Koppers or approved equal. Lumber shall be UL certification marked.

C. Pressure Treated wood associated with roof and roof edge construction which will be in contact with steel or galvanized steel components shall be wrapped or covered with Ice & Water Shield to prevent direct contact between pressure treated wood and steel.

2.5 Fastening Devices

Nails, screws, bolts, anchors, washers, clips, shields, power actuated devices and other rough hardware shall be of the sizes and types indicated on the drawings or as required to adequately anchor all members. Anchors for nailing strips and blocking shall have nuts and washers countersunk and bolts cut off flush with the top of the wood nailer. All fasteners in contact with pressured treated wood shall be galvanized.

2.6 Temporary Closures

Provide batten doors with locks at all exterior openings. Appropriate protection against weather and life safety shall be maintained throughout the job.

2.7 Blocking

Provide solid blocking at all grab bars, millwork cabinets and wall mounted units. Coordinate with Installer and/or Manufacturer.

2.8 Building Wrap - Provide building wrap over exterior surface of all exterior walls as recommended by manufacturer. Building Wrap shall be approved equal to Tyvek.

2.9 Air /Moisture Barrier - Provide building wrap over exterior surface of all exterior walls as recommended by manufacturer. Basis of Design: Spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon Dupont Tyvek Commercial Wrap and related assembly components.

3.0 - EXECUTION

3.1 Installation

A. All work shall be installed plumb and true, and secured in place with proper fastenings so as to make rigid and firm.

B. The work of this section shall be performed in the best practice relating to the trade so as to carry out the intent of the drawings and to properly accommodate the work of all trades.

C. Cut ends or faces of all treated wood shall be brushed treated with preservative.

D. Wood Studs shall not exceed 16" o.c. Provide stud framing for walls to receive

ceramic tile at 12" o.c.

E. Plywood Roof Decking shall be installed with a 1/8" expansion gap between abutting sheets, all sides.

F. All Roof Deck fasteners shall be 100% within roof framing. Nails missing or by-passing structural rafter members shall be subject to correction.

END OF SECTION

1.0 - GENERAL

1.1 Scope

A. The work under this section consists of all finish carpentry, millwork and related items.

B. Millwork shall be defined as follows: "All exterior and interior woodwork exposed to view in the finished building, except lumber yard or specialty items. All exposed wood, plywood, hard plastic and wood doors are included."

C. All millwork shall be produced by the same source of supply to coordinate matching of materials.

1.2 Submittals

A. Shop drawings shall be furnished on all millwork to the architect for approval prior to fabrication. These drawings to show size, arrangement, type of material, connections and relationship to adjacent work.

B. All shop drawings shall show species of woods and the manufacturer's name for all manufactured items.

C. When required, contractor shall submit a sample unit as requested.

D. Submit samples of decorative laminate colors, patterns, and textures for semi-exposed materials for architect’s selection. Samples of other materials or hardware shall be available if requested.

1.3 Applicable Standards

A. The Quality Standards of the American Woodwork Institute (AWI) shall apply and, by reference, are made a part of this specification.

B. Millwork materials and workmanship not shown, specified, or normally furnished to a higher degree of quality shall conform to custom grade requirements of the AWI Quality Standards.

1.4 Delivery and Storage

A. When all millwork items are ready for shipment to the job site, the architect shall be notified through the contractor so that either may inspect the work in the mill prior to shipment.

B. All materials shall be inspected by the contractor's superintendent upon receipt at the job site. No faulty or damaged materials shall be received. It shall be the contractor's responsibility to produce finished items of work in first class condition.

C. No interior millwork shall be delivered until the building has been dried out. Heat shall be required in cold or humid weather.

D. No trim shall be delivered or placed until the areas of the building in which the trim is to be placed are thoroughly dry and ready for the installation. The building shall be enclosed and heated. Allow wood to acclimate for 7-10 days prior to installation.

2.0 - PRODUCTS

2.1 General

A. All materials shall be of the best of their respective kinds. All materials used in finished work shall be clear, free from cracks, checks, knots and other imperfections that may interfere with the proper completion of the work and any warped or otherwise imperfect work shall be removed and replaced.

B. All plywood shall have a grade-trademark which shall identify each panel of plywood as to type, grade and conformance to CS45 or CS122 (current issues). If use is exposed to weather or excessive moisture, plywood shall be of the exterior type. Exposed faces and faces to receive plastic laminates shall be "A" grade. Panels used for concealed cabinet parts may be C-D grade. Thickness and application details shall be as shown on drawings or required for the intended use.

2.2 Interior Woodwork

A. Lumber used for painted interior woodwork, unless otherwise indicated, shall be one of the following:

1. Fir - Coast or Inland Douglas White
2. Pine - Ponderosa, Southern
3. Redwood
4. Cypress
5. Yellow Poplar
6. Grade of lumber used shall be second grade for paint finish, except cypress may be third grade.

B. Hardwood: All references to hardwood shall imply stain grade oak.

C. All interior plywood to be painted shall be Natural Birch.

D. All interior woodwork and plywood to be stained or finished natural shall be Premium Grade Select White Birch or as specified on drawings. Veneer shall be rotary cut or as indicated on drawings or related specification sections. Semi-exposed parts, as defined by AWI, of natural or stained casework shall be Natural Birch.

E. Lumber shall be kiln dried with an average moisture content of 6% to 11%.

F. Particle board shall be U. S. Plywood Corp. "Novoply" Weyerhaeuser Company "Timblend", or approved equal of thickness shown. Factory sanded or sealed or filled, 2 sides.

2.3 Plastic Laminate

A. Plastic laminate shall be Nevamar, Wilson-Art, Formica, Laminart, Arborite, Pionite, 1/16" thick. See Finish Legend and Schedule for color selections.

B. Backing sheet shall be high pressure laminate, .020" minimum thickness. Plastic laminate to be used on all interior open shelves. Melamine is not acceptable unless it matches the selected plastic laminate.

C. The adhesive shall be that recommended by the manufacturer of the laminated plastic used.

D. Edging Materials:
   1. 1mm PVC banding, machine applied; match laminate as scheduled.
   2. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius; match laminate as scheduled

2.4 Solids Surface Countertop

A. Solid surface countertop to be DuPont “Corian”; Color: price group “E” or better; with a matte finish, or pre-approved equal. Provide as indicated on drawings.

B. Fabrication - Countertops with sinks to be 19 mm thick; edge detail as indicated on Architectural drawings, complete with holes and cutouts for plumbing and bath accessories as indicated on drawings. Provide counter complete with back and side splashes of size shown on Architectural drawings. Fabrications to be performed by a certified Corian fabricator/installer. Components to be fabricated to greatest extent practical to sizes and shapes indicated. Form joints between components using manufacturer’s standard joint adhesive. Joints to be inconspicuous in appearance and without voids. Attach 2" wide reinforcing strip of Corian under each joint. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts and then sand all edges smooth.

C. Installation - Install components plumb and level. Adhere plumbing and bath accessories to countertops using manufacturer’s recommended adhesives and color matched silicone sealant. Adhere back and side splashes to countertop using color matched silicone sealant.

2.5 Quartz Countertop

A. Quartz countertop to be Corian; Color to be selected by Architect from manufacturer’s standard colors with polished finish or pre-approved equal. Provide as indicated on drawings.

B. Fabrication and Installation:
   1. Countertops to be 3 cm thickness unless otherwise noted. Edge detail as indicated on architectural drawings. Countertops to be installed in accordance with manufacturer’s recommendations. Apply sealants according to manufacturer.

2.6 Rough Hardware

All exposed bolts or other anchors shall be chrome-plated brass.

2.7 Finish Hardware

Furnish and install all finish hardware for millwork items including, but not necessarily limited to, cabinet door and drawer pulls and latches, adjustable shelf standards and brackets, and hardware for doors less than 1-3/8" thick. Hardware finish shall match room door hardware finish.

2.8 Thickness of Members

All thicknesses shall be in accordance with the maximum possible dressed size from standard lumber. If widths or thicknesses are not available in hardwood, gluing may be used on widths over 5-1/4" or thicknesses over 1-1/6".

2.9 Workmanship

A. All exposed surfaces and edges shall be finished smooth and be free of saw cuts, marks or defacement. All joints shall be accurately and neatly made and fit.

B. End grain shall be concealed. Exposed edges of plywood shall present a finish the

same as the finished sides.

C. Work shall be scribed and fit to other finished surfaces in a careful manner. Should other work be damaged or disturbed, it shall be made good at the expense of this contractor.

D. Work shall be assembled at the mill insofar as is practicable and delivered ready for erection. When necessary to cut and fit on job, the material shall be made up with ample allowance for cutting.

E. This contractor shall verify all measurements at the building and shall examine all adjoining work on which his work is dependent.

F. Millwork shall be executed in accordance with the approved shop drawings, the workmanship shall be of first quality and the construction of all parts shall be of the best current practice. The work shall be assembled so as to hold together with close joints, fastenings shall be concealed, and all work shall be properly and firmly backed and blocked as required. Provision shall be made for expansion and shrinkage.

G. Exposed surfaces shall be machine-sanded to an even, smooth surface, nails set, ready for finishing or pre-finishing when noted. All woodwork shall be dry, clean, and smooth before any finishing materials are applied. All nail holes, cuts, cracks and other defects shall be treated so as to be unnoticeable.

H. All wood surfaces to be set against masonry and/or concealed after erection shall be given a heavy coat of sealer. All woodwork to have paint finish shall be primed under the PAINTING SECTION.

I. All transparent finished (i.e., stained) woodwork shall be shop finished by Millwork Contractor.

J. All caulking to match laminate or stain color.

K. All millwork/casework cabinets in contact with finish floor shall receive scheduled base.

2.10 Carpentry and Millwork Items

A. The following millwork items are intended to guide such work in this project and do not necessarily limit the scope of this section.

B. Where not otherwise specified, shelving, cabinet work and millwork of all types shall conform with requirements of Premium Grade of "Quality Standards of the Architectural Woodwork Industry" (Architectural Woodwork Institute).

C. Wood Base and Shoe Mould - Shall be as detailed on drawings. Base shoe mould lengths to be maximized wherever possible. Wood scraps and remnants used for base material is NOT acceptable. Minimum 8' lengths.

2.11 Materials and Construction

A. MDF (Medium Density Fiberboard)
Shall be equal to Premier7 MDF, Plus Grade. MDF is to be shop finished by Millwork Contractor with a transparent stain. The actual surface of the MDF is to be visible through the stain color. Stain colors are to match paint selections indicated on drawings. Millwork Contractor to provide stain samples to Architect for approval prior to fabrication.

B. Panels - End panels, shelves, bottoms and partitions of 3/4" Birch plywood, "Good" grade on all surfaces or plastic laminate covered particle board as approved. All other surfaces may be A grade fir plywood. All edges exposed to sight shall be self edged and sanded smooth and flush.

C. Doors - Construction of 3/4" Birch plywood, "Good" grade or plastic laminate covered particle board as approved. All edges shall be self edge.

D. Drawers - Front identical to doors above. Back minimum of 1/2" A-A Grade fir plywood. Sides of solid hardwood of sound grade. Bottoms of 1/4" plywood or 1/4" brown welded fiber board. Front and back connection shall be rigid type. Bottoms shall be let into front, back and sides approximately 1/4 of an inch. Drawer interiors to be Melamine.

E. Backs - Backs shall be a minimum of 1/4" plywood or 1/4" brown welded fiber board. Open to view 1/4" Birch plywood. All open-to-view backs are to receive plastic laminate.

F. Adjustable Shelves - 3/4" thick for maximum spans of 30". 1-1/8" thick for maximum spans of 42". All open-to-view shelves are to receive plastic laminate.

G. Cabinet Base – Cabinet Base and tall units shall have a site-built toe base constructed of 3/4-inch (minimum) lumber unless otherwise shown on the drawings. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawings. Particle board is not acceptable.

H. Finishes – Tops, edges, and backsplashes and any other areas noted shall be plastic laminate covered.

I. Cabinet Hardware - Contractor shall furnish hardware equal to that as manufactured by Stanley, as hereinafter specified. All hardware to be Brushed Chrome, unless indicated otherwise on drawings.

Pull Handles -
4" wire pull, brushed chrome finish. Two pulls on drawers over 30" wide.

Drawer Guides -
Regular, knee space and pencil: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.

File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

Door Hinges - Five knuckle, epoxy powder coated, institutional grade, 2-3/4 inch overlay type with hospital tip. 0.095 inch thick. ANSI-BHMA standard A156.9, Grade 1.
Doors 48 inches and over in height have 3 hinges per door.

Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.

1. Finish to be selected by Architect.

3.0 - EXECUTION

3.1 Shop Assembly

When it is possible, all items of millwork which can be carried into the building through doorways or windows shall be shop assembled. When it is impractical to shop assemble the entire item in one piece, it shall be shop assembled in sections and perfectly fitted in place on the job by thoroughly experienced and competent mechanics. Where job joining requires gluing, it shall be done by the same method used in the Shop.

3.2 Installation

A. All finish carpentry and millwork of every sort shall be put up plumb or level, and straight and true. Trim put up with proper grounds and firmly secured. All work fitted and scribed to other work in a careful manner as not to injure the surface in any way. All nailing shall be blind wherever possible, but where not possible, the nailing driven and set so as to be not visible in the finish.

B. All trim to be free from defects impairing durability or fitness for receiving finish. All trim properly sanded at mill and hand sanded at the job.

C. Finished surfaces of interior millwork, detailed or scheduled to be painted, shall be left ready for treatment by the painter. The jointing and framing of all members of the finished millwork shall be executed in accordance with the best and latest recognized mill practice.

D. This contractor shall cooperate with contractors for other trades with which his work comes in contact.

3.3 Finish Hardware

A. Install items of hardware furnished under FINISH HARDWARE SECTION.

B. Hardware shall be accurately fitted and securely attached, without damage to metal or woodwork, and care shall be taken to not mar or injure any work.

C. Hardware shall be protected as approved or removed for painting.

D. Upon completion of the work, hardware shall be demonstrated to work freely, keys shall be fitted into their respective locks and upon acceptance of the work, all keys shall be tagged and delivered to the Owner.

E. All open -to- view shelves are to receive heavy duty, double cleated adjustable standard hardware.

END OF SECTION

1.0 - GENERAL

1.1 Scope

A. All labor, material, sub-framing and finiah preparation necessary to provide Architectural fiberglass Columns with components and accessories hereafter specified and/or indicated on the drawings.

B. Provide Brackets, Columns, Capitals, Bases, all trim components and members indicated and/or required.

1.2 Work Not Included

General millwork, metal trim work, wood trim items and blocking in walls. Finish painting.

1.3 Manufacturer

Shall be approved equal to Dixie-Pacific or Fibertech.

1.4 Substitutions

Other nationally recognized manufacturers may be proposed, provided the material is equal to that specified and written approval is obtained and will be notified via Addendum. Proposed substitution must conform to design, function and quality of specification. Manufacturers requesting approval shall submit evidence of at least five (5) years experience, financial stability and installation of product similar to that specified. Submit with the manufacturer's data and comply with Section 01360 - Substitution Procedures, not less than ten (10) days prior to bid opening.

1.5 Shop Drawings

Submit shop drawings to the architect for approval prior to fabrication. The drawings will show size, arrangement and type of material, connections and relationship to adjacent work. See Section 01350 - Submittal Procedures.

1.6 Job Dimensions

Provide new fiberglass columns as indicated to match existing. Field Verify.

1.7 Guarantee

The Custom Composition Molding Work contractor shall guarantee all materials and workmanship covered by this section in accordance with industry standards from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier. Warranty/Guarantee shall be submitted with Contractor's bid.

2.0 - PRODUCTS

2.1 Fiberglass Material

A. Material composed of highly advanced fiberglass reinforced polymers (FRP). Decay resistant.

B. Shafts shall be 100% factory sanded.

C. Components shall be limited in size and weight to approximately 150 pounds for ease of handling. Joint location shall be as approved and noted on shop drawings.

D. Design shall include joints, anchor lugs and devices necessary for proper anchorage.

3.0 - EXECUTION

3.1 Inspection

The installer must examine the jobsite and the conditions under which the work under this section is to be performed. Do not proceed with work under this section until any unsatisfactory conditions have been corrected. Installation shall be in full accordance with manufacturers' recommendation and specifications.

3.2 Installation

A. Install work with factory-trained supervision authorized by manufacturer. Erect plumb, level, true, accurate and straight with no distortions.

B. Installation

1. Installer shall inspect and approve sub-surface.

2. Non-corrosive bolts and anchor devices shall be countersunk and opening filled with a matching mixture as provided by the manufacturer.

3.3 Cleaning and Protection

A. Repair or remove and replace defective work.

B. Clean surfaces, repair minor damage and replace other damaged parts or units.

C. Advise contractor of procedures and precautions for protection of work from damage by other trades until acceptance of the work by the owner.

END OF SECTION

1.0 - GENERAL

1.1 Summary

A. Section Includes:

1. Provide a complete vapor-protective, composite sheet membrane waterproofing system.

2. Work includes all applicable sealants, waterstops and waterproofing flashings needed to ensure a complete waterproof and vapor-protective membrane system for buried concrete and masonry components.

1.2 Submittals

A. Comply with Specification Section 01350.

B. Product Data:

1. Materials list of items proposed to be provided under this Section.

2. Manufacturer's specifications and other date needed to provide compliance with the specified requirements.

3. Shop drawings and/or catalog illustrations in sufficient detail to show installation and interface of the work of this Section with the work of adjacent trades.

4. Manufacturer's current recommended installation procedures which, when reviewed by Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

5. Written documentation of applicator's qualifications, including reference projects of similar scope and complexity, with current phone contacts of Architects and Owners for verification.

C. Mock-Up:

1. Prior to installation, prepare a sample panel of the work of this Section at a location on the job site where approved by the Architect.

2. Make the sample panel in dimensions approved by the Architect and with one panel for each of the various types of installation.

3. Show all aspects of the work of this Section to the quality specified.

4. Make necessary adjustments in the sample panel(s) and secure the Architect's approval.

5. The sample panel(s), when approved by the Architect, will be used as a datum point for comparison with the remainder of the work of this Section for the purpose of acceptance or rejection.

6. Upon approval of the Architect, the sample panel(s) may become actual part of the installation required for this Work.

1.3 Quality Assurance

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

B. Application qualifications:

1. Applicator shall have at least three years’ experience in installing materials of types specified and shall have successfully completed at

least three projects of similar scope and complexity.

2. Applicator shall designate a single individual as project foreman who shall be on site at all times during installation.

C. Convene a pre-installation job site conference three weeks prior to commencing work of this Section:
1. Secure attendance by the Architect, Contractor, Applicator and authorized representatives of the vapor-protective waterproofing system manufacturer and interfacing trades.

2. Examine drawings and specifications affecting work of this Section, verify all conditions, review installation procedures and coordinate scheduling with interfacing portions of the Work.

1.4 Delivery, Storage and Handling
A. Deliver materials to job site in manufacturer's unopened containers with all labels intact and legible at all times.

B. Maintain the products in a dry condition during delivery, storage, handling, installation and concealment.

1.5 Substrate Conditions
A. Provide applicator with substrates that are free of standing water, dirt and debris, loose material, voids and protrusions or deformations which may inhibit application or performance of waterproofing.

1. Where work of this Section will be installed on earth retaining system, fill gaps and voids in earth retaining system to conform with waterproofing manufacturer's requirements; remove nails in wood lagging.

2. Where work of this Section will be installed on concrete and/or masonry, provide substrates that are free of voids deeper then 3/8" and free of surface protrusions more than 1/4" above the surface.

3. Where work of this Section will be installed on concrete footings or mud slab, provide smooth finish to surfaces scheduled to receive the vapor-protective waterproofing.

4. Where work of this Section will include bentonite waterstop strips, provide smooth concrete surfaces as required for installation.

5. Rigidly install penetrations of vapor-protective waterproofing for detailing procedures.

B. Groundwater:
1. Where work of this Section will encounter groundwater, provide waterproofing manufacturer with sufficient groundwater samples taken from Project at logged locations for manufacturer's laboratory analysis.

2. Manufacturer shall provide written report confirming laboratory testing with regard to suitability of waterproofing system for installation in Project conditions.

1.6 Warranty
A. Deliver to the Architect signed copies of the following written warranties against defective materials and workmanship for a period of Five Years following date of completion. Warrant that installed waterproofing system shall be free of defects including waterproofing failure resulting from substrate cracking up to 1/8 inch.

B. Warranties shall include:
1. Manufacturer's standard five-year warranty covering materials.

2. Applicator's standard five-year warranty covering workmanship.

2.0 - PRODUCTS

2.1 General

A. General:

1. Provide a complete envelope from finish grade to below of dual-waterproofing, vapor-protective, composite sheet membrane system composed of high-density polyethylene having a sodium-bentonite face with a protective laminate layer of spun polypropylene designed for buried concrete or masonry construction having the following attributes.

   a. Acceptable products:
      1. Paramount Paraseal LG
      2. Paramount Paraseal GM

2. Clay-Tite Waterproofing Membrane System by W.R. Meadows - Sealtite is also a pre-approved Waterproofing System. Use as recommended by Manufacturer.

B. Membrane Properties:
Equal to Paramount Paraseal LG for use on buried vertical and horizontal surfaces such as backfilled foundation and retaining walls and below slab or mud slab with bentonite-side down:

1. Puncture resistance 169 lbs. ASTM E 154

2 Tensile strength 4,000 psi ASTM D412

3. Water vapor permanence 0.03 perms ASTM E96

4. Percent elongation 700 percent ASTM D638, Type 4 Dumbbell

5. Resistance to hydrostatic head 150 feet ASTM D751

6. Warranted crack-bridging capability 1/8 inch

C. Membrane Waterproofing required at substrate surfaces at areas of stone masonry provide Fluid-Applied, Elastomeric Coal-Tar Free Waterproofing such as TREMproof 201/60R or pre-approved equal.

2.2 Accessories

A. For installation at horizontal-to-vertical junctures, provide Paramount Paragranular loose bentonite granules in weatherproof 50 lb. bags and capable of swelling to occupy a minimum volume of 17 ml when 2 grams are dispersed into deionized water.

B. For detailing vertical junctures and penetrations, provide Paramount Paramastic non-hydrated expandable mastic of trowelable consistency containing not less than 55 percent high swelling Wyoming sodium-bentonite.

C. Provide the following fasteners as needed:

1. Case-hardened steel nail with fluted shank having a minimum 1" length and a minimum 1" diameter cap for use on green concrete and masonry substrates.

2. Powder shot steel pin having a minimum 3/4" diameter washer for use on concrete substrates.

3. Steel staples approved by membrane manufacturer for use according to

Project conditions.

D. Provide the following seam tapes as needed:
   1. Paramount Permanent Seam Tape reinforced, rubberized-asphaltic waterproofing seam tape 4" wide by 60 mils thick for simple lap sealing of membrane.

   2. Paramount Para JT Tape non-reinforced, adhesive tape of partially cross-linked polymeric elastomers 2" wide by 1/8" thick for molding form-fit seals around difficult contours and for integral seam seals within overlaps.

E. Provide Paramount Paraterm Bar extruded aluminum bar with upper flange to receive sealant for terminations at grade line and on parapet walls.

F. Provide Vulkem 116/227 Sealant one- or two-part, gun-grade polyurethane sealant for completing termination seals and other sealing recommended by manufacturer.

G. Provide Vulkem 101/102 Elastomeric Flashing 100 percent solids polyurethane, liquid-applied, elastomeric waterproofng flashing.

H. Provide Paramount Parastick 'N' Dry pressure sensitive, double-sided tape laminate of bentonite sandwiched between a netting and non-woven fabric for wrapping through-concrete imbeds and other detailing.

I. Provide Paramount Superstop flexible, reinforced, bentonite-laminate waterstop strips 1/2 " by 1" by 20'-0" with pressure-sensitive adhesive backing for sealing static cold joints in concrete.

J. Provide Paramount Paraprimer versatile adhesive bonding agent formulated for use with tapes and pressure-sensitive waterproofing accessories.

K. Provide Paramount Paradrain composite drainage mats composed of rot resistant non-woven filter fabric on high-density polyethylene drainage core.

L. Provide base sheet of minimum 6 mil polyethylene sheet for use as hydration barrier.

M. Provide protection course as recommended by the waterproofing system manufacturer.

2.3 Other Materials

Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor and approved by the vapor-protective waterproofing system manufacturer as compatible, subject to review of the Architect.

3.0 - EXECUTION

3.1 Surface Conditions

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section and to prevent damage to installed waterproofing.

B. Applicator shall examine the areas and conditions under which work of this Section will be performed.

   1. Verify conformance with manufacturer's requirements.
   2. Report unsatisfactory conditions in writing to the Architect.
   3. Do not proceed until unsatisfactory conditions are corrected.

3.2 Preparation

A. General: Surface preparation and detailing procedures shall be in accordance with this Specification and Drawings. Comply with waterproofing system manufacturer's instructions except where more stringent requirements are indicated or specified.

B. Lay out project to determine and anticipate conditions prior to start of work.

C. Note termination and penetration conditions to determine methods for creating a waterproof and vapor-protective envelope. Verify that where below-grade waterproofing extends to grade, other waterproofing provides for substrate continuing above grade.

3.3 Installation

A. General: Install waterproofing system in accordance with manufacturer's instructions, recommendations and specific project instructions as applies to the Work.

1. Coves: Form 2" coves with granular bentonite at horizontal-to-vertical junctures such as footings and horizontal shelves; form 2" coves with sealant, elastomeric flashing or non-reinforced tape at vertical inside corners, under ledges and at penetrations.

2. Place membrane in manner that assures minimum handling; fit closely to and seal around inlets, outlets and other penetrations; press membrane tight to corner surfaces and securely fasten.

3. Priming: Prime concrete, masonry and metal surfaces with substrate primer immediately prior to application of tapes and pressure-sensitive waterproofing accessories. Prime membrane surfaces immediately prior to application of tapes as required for a tight seal.

4. Taping: Tape seams closely following membrane placement and immediately roll-press using 2" wide hand-held seam roller to affect a tight seal.

5. Gradeline terminations: Terminate membrane system with termination bar finished off with bead of sealant or terminate to elastomeric flashing using reinforced seam tape.

6. Construction joints: Protect static construction joints in concrete with flexible, reinforced, bentonite-laminate waterstop strips; install to suitable hardened concrete surface prior to subsequent concrete placement.

7. All shingles shall be hand nailed. Installation with a Nail gun shall not be permitted.

8. Coordinate with gymnasium equipment for floor sleeves and electrical control boxes and provide waterproofing membrane system to encompass thickened slab areas for such equipment as required.

B. Below Slab Installation: Bentonite-side down use Paraseal LG Membrane:

1. Install polyethylene base sheets with edges lapped 5" over stable, smoothed and compacted subgrade or mud slab; trim base sheet away from penetrations and terminations.

2. Install membrane bentonite-side down with edges lapped 3" minimum over polyethylene base sheets; position membrane sheets to stagger end laps 12”; tape seams with reinforced seam tape and roll-press to affect a vapor tight seal.

3. Install vapor-protective waterproofing to wrap footings and grade beams where shown on Drawings.

4. Turn membrane up 6" minimum along bottom edges of slabs, wrapped footings and wrapped grade beams. Install double layer of membrane along bottom edges of slabs, wrapped footings and wrapped grade beams extending 6" minimum from edges in each direction. Avoid overlaps coinciding between layers. Provide for tie-in of subsequent membrane installation.

5. Install membrane across top surfaces of unwrapped footings or mud slab and turn up 4" minimum onto vertical faces of concrete walls and columns. Terminate leading edges with continuous seam tape and continuous waterstop strip in accordance with manufacturer's recommendations to affect a vapor tight seal.

6. Install vapor-protective waterproofing to overlap 4" minimum onto top surfaces of unwrapped grade beams and carry to extend indicated on Drawings. Terminate leading edges with continuous seam tape and continuous waterstop strip in accordance with manufacturer's recommendations to affect a vapor tight seal.

7. Waterproof penetrations in accordance with manufacturer's recommendations.

8. Verify membrane is protected from damage caused by rebar and support chairs.

9. Inspect and repair damaged material immediately; before concrete placement, manufacturer's representative must inspect the system and issue to the Architect a report of acceptable installation.

C. Backfilled Wall Installation: Paraseal LG Membrane:
1. Install membrane sheets in vertical or horizontal lifts with HDPE-side facing applicator to prepared surfaces conforming to manufacturer's requirements.

   a. Vertical orientation: Securely fasten membrane 12" on center along top edge with sheet extending onto footing surfaces and overlapping below-slab membrane 6”; install subsequent membrane sheets to overlap previous sheets 1-1/2" minimum; securely fasten membrane 24" on center through both sheets at overlaps; securely fasten 18" on center to tops of footing surfaces and horizontal shelves; tape seams with reinforced seam tape and roll-press to affect a vapor tight seal.

   b. Horizontal orientation: Start membrane at lowest portion of wall; securely fasten membrane 24" on center along top edge with sheet extending onto footing surfaces and overlapping under slab membrane 6”; install subsequent membrane sheets to overlap previous sheets minimum 1-1/2" in shingle fashion with staggered end laps; securely fasten membrane 24" on center through both sheets at overlaps; securely fasten 18" on center to tops of footing surfaces and horizontal shelves; tape seams with reinforced seam tape and roll-press to effect a vapor tight seal.

2. Waterproof penetrations in accordance with manufacturer's recommendations.

D. Blindside Wall Installation: Paraseal GM-LG Membrane:
1. Ensure that vertical surfaces to receive waterproofing system conform to manufacturer's requirements as applicable to the earth retaining system employed prior to commencing installation.

2. Install waterproofing membrane starter-strip with bentonite-side facing

applicator to vertical surfaces of earth retaining system prior to placement of concrete footings or foundation mat slab.

3. Prepare all vertical inside corners that occur along the earth retaining system by fastening a minimum 12" wide strip of membrane with bentonite-side facing applicator pressed tight into corner; securely fasten along both edges 24" on center.

4. Remove bentonite from face of membrane inside overlaps, extending 2" in from lap leading edges, by removing factory installed edge tape or by scraping; install membrane sheets vertically with bentonite-side facing installer and mechanically fasten along lap edges cleaned of bentonite at 24" on center; restrict fasteners to lap edges cleaned of bentonite.

5. Wipe clean HDPE surfaces inside overlaps just prior to contacting with tape using lint free white cloths soaked in solvent; install non-reinforced integral seam tape to HDPE surfaces cleaned of bentonite along lap edges strictly aligning the adhesive mass on membrane leading edge, not behind it, covering completely all mechanical fasteners; roll-press seam tape into place prior to removal of the release-paper backing.

6. Install subsequent membrane sheets to overlap previous sheets 4”; remove release-paper backing from seam tape within overlaps and roll-press membrane sheets together to affect a vapor tight seal.

7. Verify which penetrations must be accessed after concrete placement for completion of waterproofing detail treatment and ensure that sufficient access to membrane is provided within a formed boxout; verify which penetrations will not be accessed after concrete placement for completion of waterproofing detail treatment and effect final detailing procedures prior to erection of concrete formwork or shotcreting/guniting; seal all penetrations in accordance with manufacturer's current procedures as required to seal against both water and vapor.

8. Protect vapor-protective waterproofing system from excessive rain.

9. Inspect and repair damages to vapor-protective waterproofing system immediately prior to erection of concrete formwork or shotcreting/guniting; ensure that concrete directly contacts membrane.

10. Complete waterproofing details and terminations at gradeline coordinating with other trades.

E. Drainage Mat Installation:
Install drainage mat units where finish floor is below grade according to manufacturer's installation instructions as shown in installation manuals. Extend drainage to brake grade with positive fall.

END OF SECTION

1.0 - GENERAL

1.1 Section Includes

A. Surface preparation.

B. Application of a solvent type liquid applied dampproofing membrane.

Note: This product shall not be installed until adjacent roof construction has been dried-in. CMU walls must be dry on both sides before application.

1.2 References

A. Spray or Brush-on dampproofing coating
   1. ASTM D4479-00 - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.

B. Trowel applied dampproofing coating
   1. ASTM D4586-00 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

1.3 Submittals

A. Comply with Section 01350 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

1.4 Delivery, Storage, and Handling

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean dry area in accordance with manufacturer's instructions.

C. Store at temperatures of 40°F (5°C) and above to facilitate handling.

D. Do not store at temperatures above 90°F (32°C) for extended periods.

E. Keep away from sparks and flames.

F. Protect materials during handling and application to prevent damage or contamination.

1.5 Environmental Requirements

A. Product not intended for uses subject to abuse or permanent exposure to the elements.

B. Do not apply membrane when air or surface temperatures are below 35°F (2°C).

C. Do not apply to frozen concrete.

D. Do not apply when rain is imminent.

2.0 - PRODUCTS

2.1 Manufacturer

A. W.R. Meadows, Inc or pre- approved manufacturer with similar solvent based products.

2.2 Materials

A. Spray applied solvent dampproofing should be an asbestos-free, non-fibered asphalt compound that meets the U.S. EPA Architectural Coatings Rule requirements for VOC content.
   1. Spray-Mastic by W.R. Meadows.

B. Brush applied solvent dampproofing should be an asbestos-free, fibered, asphalt compound that meets the U.S. EPA Architectural Coatings Rule requirements for VOC content. For use to protect exterior below-grade masonry walls.
   1. Semi-Mastic by W.R. Meadows.

2.3 Accessories

A. Waterproofing Protection Course: Protection Course.

B. Rolled Matrix Drainage System: Mel-Drain™ Rolled Matrix Drainage System.

3.0 - EXECUTION

3.1 Examination

A. Examine surfaces to receive membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 Surface Preparation

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Concrete surfaces must be clean, smooth and free of standing water.

E. Patch all holes and voids and smooth out any surface misalignments.

3.3 Application

A. Apply dampproofing in accordance with manufacturer's instructions.

B. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.

3.4 Protection

A. Protect membrane on vertical and horizontal applications with immediate application of protection course, if no drainage system is used, or rolled matrix drainage system.

B. Backfill within 24-48 hours using care to avoid damaging the dampproofing.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work under this section consists of all building insulation except rigid roof insulation.

1.2 Submittals
Submit samples of all materials hereinafter specified for approval.

1.3 Protection
All thermal insulation shall be maintained dry throughout construction. Wet insulation shall be rejected.

2.0 - PRODUCTS

2.1 Material

A. Primary: FSK Thermal insulation shall be batt, or blanket type having a vapor barrier on one face which shall be extended to form a 1" flange to comply with requirements of International Building Code. ASTM - C665 Type III, Class A and ASTM E - 84. The insulating material shall be fire and decay-proof, moisture-resistant mineral or glass wool specifically designed for use in insulating batts. Vapor barrier side laps shall be lapped and taped over support members. Vapor barrier materials shall be FSK foil-type and also comply with requirements for a ceiling return air plenum regardless.

C. Unfaced Thermal insulation shall be batt, or blanket type to comply with requirements of International Building Code. ASTM - C665 Type III, Class A and ASTM E - 84. The insulating material shall be fire and decay-proof, moisture-resistant mineral or glass wool specifically designed for use in insulating batts.

Thermal Resistance Values (R) as follows:

R-30 9" - 10"
R-22 7"
R-19 6" - 6-1/2"
R-11 3-1/2" - 4"

D. Masonry Foam Fill Insulation shall be approved equal to:
1. Core Foam Masonry Foam Insulation by cfiFOAM.
2. Other Pre-approved manufacturers:
   a. Applegate C Foam Insulation by Applegate R Foam, Inc.
   b. Core-Fill 500 by Tailored Chemical Products, Inc.
3. Minimum Product Performance Standards
   a. Fire-Resistance Ratings: Foam shall neither add to nor detract from fire-resistance ratings of insulated fire-resistance rated CMU walls per prevailing building codes.
   b. Surface Burning Characteristics: Class A per ASTM E84; Flame Spread Index ≤ 25; Smoke Developed Index ≤ 450.
   c. Thermal Resistance: R-4.6/inch @ 75ºF per either ASTM C518 or ASTM C177
   d. Potential Heat: ≤ 100 Btu/lb. when tested per NFPA 259 (ASTM D5865).
4. Installation Guidelines
   a. Fill all open cells and voids in hollow concrete masonry walls

where shown on the drawings.

b . The foam insulation shall be pressure injected through a series of 5/8" to 7/8" diameter holes drilled to access each column of block cells e.g. 8” o/c beginning approximately four (4) feet above the finished floor.

c. Repeat this procedure at 10’ to 16’ intervals above the first horizontal row of holes (or as needed) until the empty core cells are completely filled.

d. In walls where horizontal bond beams occur, repeat the procedure above the bond beams to assure insulating the entire wall.

e. If “Hi-Flow” nozzles by cfiFOAM, Inc. are used, foam may be injected at up to twenty (20) foot vertical intervals.

f. Patch holes with mortar and score to resemble adjacent surfaces. Insulation shall not be injected into wet walls.

5. Quality Assurance

a. Manufacturing Standards; Provide insulation from a single approved source. Product components shall be of the same brand from the same approved source arriving at the site either pre-mixed according to the manufacturer’s printed instructions or in unopened factory sealed containers.

b. Installer Qualifications for Foamed-In-Place Masonry Insulation:

1.) Engage an authorized contract installer who has been trained, authorized and equipped by the product manufacturer.

c. At the Architect’s request, the Installer shall provide infrared scanned images of the work prepared by a “Block Wall Scan IR” or equivalent trained IR technician to confirm that empty core cells are filled with foam insulation.

1.) Insulation voids shall be foamed at no added cost to the Owner.

E. Rigid thermal insulation shall be 1" thick by 16" wide for cavity walls and 24" wide if indicated for slabs. The insulating material shall have a minimum compressive strength of 25 psi and maximum water vapor transmission rate of 1.1 perm-inch and shall conform to ASTM C578, Type III-IV, R-value/inch @ 75 degrees F 5.0. Adhesive, in cavities, shall be equal to Styrofoam brand mastic #7 or #11 as distributed by Dow. All joints shall be taped.

G. Sound Attenuation Batt Insulation shall be 3-1/2" thick fiberglass insulation with a Noise Reduction coefficient of 1.05. Equal to Owens Corning.

H. Air/Vapor Barrier - Basis of Design: Spunbonded polyolefin, non-woven, non-perforated barrier equal to Dupont Tyvek Commercial Wrap, Class A and related assembly components. All seams, edges and penetrations shall be taped and sealed per manufacturer's recommendations.

1. Shall be allowed as a substitution and similar to FSK facing material. As such this material would be used in conjunction with unfaced insulation and shall be provided continuous and attached to applicable framing members. All seams, edges and penetrations shall be taped and sealed per manufacturer's recommendations.

3.0 - EXECUTION

3.1 Installation

A. Thermal Insulating material shall be laid tight and installed so as to avoid gaps and settlement. All voids, offsets, and bends shall be completely filled. R values shall be provided as indicated in single layer or multiple layers totaling the “R” value indicated. If multiple layers are used to meet total “R” value indicated, layers must

be provided perpendicular to one another. The layer closest to the conditioned space must be provided with FSK facing on the interior face where visible for an Inspection.

Insulation shall be laid tight and continuous over all areas where indicated.

B. Masonry foam fill insulation shall be provided at all exterior wall assemblies and where indicated to thoroughly fill CMU cells and voids continuous from bottom to top of exterior and applicable masonry walls. Install in accordance with manufacturer's printed recommendations and procedures.

C. Rigid thermal insulation

1. Walls - Adhere insulation to walls in a horizontal position, closely butted and with vertical joints staggered. Provide joint mastic and joint tape to the foam and apply in accordance with manufacturer's recommendations.

2. Floor Slab - Lay insulation on vapor barrier butted end to end at full perimeter of exterior walls.

   Backfill against insulation with fill and gravel.

3. During storage and insulation, observe good fire safety practices, including job site housekeeping.

4. If adhesive is required, use mastic for bonding foam board to non-absorbent surfaces such as dense concrete, metal, brick, glass, and paint.

D. Rigid thermal insulated sheathing shall be placed on stud system and secured in accordance with manufacturer's recommendations and specifications. (NOTE: Use 4 x 8 x 3/4" plywood sheathing at all corners and wall openings.)

E. Sound Attenuation Batt Insulation shall be placed on ceiling or stud system and secured and sealed in accordance with manufacturer's recommendations and specifications. Place around or over mechanical equipment rooms, toilet rooms, window in-fill spaces, and other areas as indicated.

F. Mesh, shall be provided for supporting overhead horizontal insulation and attached to applicable framing members as required, not to exceed 16" o.c. Mesh material shall be provided to maximize width as project conditions permit. Mesh fabric shall be steel wire type with nominal 2" grid. Continuous metal straps at 16" o.c. shall be an acceptable substitute.

G. Air/Vapor Barrier - Shall be allowed as a substitution and similar to FSK facing material. As such this material would be used in conjunction with unfaced insulation and shall be provided continuous and attached to applicable framing members. All seams, edges and penetrations shall be taped and sealed per manufacturer's recommendations. Basis of Design: Spunbonded polyolefin, non-woven, non-perforated barrier equal to Dupont Tyvek Commercial Wrap, Class A and related assembly components.

END OF SECTION

1.0 - GENERAL

1.1 Summary

A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls

1.2 Submittals

A. Manufacturer's specifications, details, installation instructions and product data

B. Manufacturer’s code compliance report

C. Manufacturer's standard warranty

D. Applicator's industry training credentials

E. Samples for approval as directed by architect or owner

F. Sealant manufacturer's certificate of compliance with ASTM C 1382

G. Prepare and submit project-specific details (when required by contract documents)

1.3 References

A. ASTM Standards:

- B 117 Test Method for Salt Spray (Fog) Testing
- C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
- C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
- C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
- C 1382 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
- D 522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
- D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
- D 968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
- D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- D 3273 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 96 Test Methods for Water Vapor Transmission of Materials
- E 119 Method for Fire Tests of Building Construction and Materials
- E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 1233 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference
- E 2098 Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution
- E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)

E 2178 Test Method for Air Permeance of Building Materials
E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
E 2485 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings
E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
E 2570 Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
G 153 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
G 154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

B. Building Code Standards
AC 235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November, 2009)

C. National Fire Protection Association (NFPA) Standards
1. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
2. NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus

D. Other Referenced Documents
1. American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test
2. APA Engineered Wood Association E 30, Engineered Wood Construction Guide
3. ICC-ES ESR-1233, StoGuard with Gold Coat, StoGuard with Emerald Coat, and StoGuard Vapor Seal Water-Resistive Barriers and StoEnergy Guard
4. ICC-ES ESR-1748, StoTherm® NExT®

1.4 Design Requirements

A. Wind Load
1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
2. Design for wind load in conformance with code requirements.
3. Maximum wind load resistance: ± 188 psf (9.00 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.

B. Moisture Control
1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:
a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.

b. Air Leakage Prevention – provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.

c. Vapor Diffusion and Condensation – perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

C. Impact Resistance

Provide ultra-high impact resistance of the EIFS to a minimum height of 6'-0" (1.8 m) above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than “Standard” on contract drawings.

D. Color Selection

Select finish coat with a light reflectance value of 20 or greater. Architect to select from full range of colors.

E. Joints

1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.
2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).
3. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.
4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.

F. Grade Condition

Provide minimum 6 inch (152 mm) clearance above grade or as required by code.

G. Trim, Projecting Architectural Features and Reveals

1. All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All reveals must have minimum ¾ inch (19 mm) insulation thickness at the bottom of the reveal. All horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance.

2. Do not use the EIFS on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing.

H. Insulation Thickness
1. Minimum EPS insulation thickness is 1 inch (25 mm).
2. Maximum EPS insulation thickness is 12 inches (305 mm), except as noted below for fire-resistance rated wall assemblies.

I. Fire Protection
1. Do not use EPS foam plastic in excess of 12 inches (305 mm) thick on types I, II, III, or IV construction unless approved by the code official.
2. Where a fire-resistance rating is required by code use the EIFS over a rated concrete or concrete masonry assembly. Limit use over rated frame assemblies to non-load bearing assemblies (the EIFS is considered not to add or detract from the fire-resistance of the rated assembly). Maximum allowable EPS thickness: 4 inches (102 mm).
3. Refer to manufacturer's testing or applicable code compliance report for other limitations that may apply.

1.5 Performance Requirements

A. Comply with ASTM E 2568, ASTM E 2570, and the following:

Table 1 Air/Moisture Barrier Performance

TEST	METHOD	CRITERIA	RESULT
1. Water Penetration Resistance	AATCC 127 (Water Column)	Resist 21.6 in (55 cm) water for 5 hours before and after aging	Pass
2. Water Penetration Resistance after Cyclic Wind Loading	ASTM E 1233 / ASTM E 331	No water at exterior plane of sheathing after 10 cycles @ 80% design load and 75 minutes water spray at 6.24 psf (299 Pa) differential	No water penetration
3. Water Resistance Testing	ASTM D 2247	Absence of deleterious effects after 14 day exposure	No deleterious effects
4. Water Vapor Transmission	ASTM E 96 Method B (Water Method)	Measure	Sto Gold Fill®*: 7.10 perms [408 ng/(Pa·s·m^2)] Sto Gold Coat: > 10 perms [574 ng/(Pa·s·m^2)]
5. Air Leakage (material)	ASTM E 2178	≤ 0.004 cfm/ft2 at 1.57 psf (0.02 L/s•m2 at 75 Pa)	Pass
6. Air Leakage (assembly)	ASTM E 2357	≤ 0.04 cfm/ft2 (0.2 L/s•m2)	Pass
7. Structural Integrity	ASTM E 330	2-inches (51 mm) H_2O pressure (positive & negative) for 1 hour.	Pass
8. Dry Tensile Strength	ASTM D 882	20 lbs/in (3503 N/m), minimum before and after aging	Sto Gold Fill:* 159 lbs/in (27845 N/m)) before aging 213 lbs/in (37302 N/m) after aging

TEST	METHOD	CRITERIA	RESULT
9. Pliability	ASTM D 522	No Cracking or Delamination using ⅛" (3 mm) mandrel at 14°F (-10°C) before and after aging	Pass
10. Surface Burning	ASTM E 84	Flame Spread 0 – 25 for NFPA Class A, UBC Class I	Flame Spread: 5 Smoke Density: 10
11. Tensile Adhesion	ASTM C 297	>15 psi (103 kPa)	>30 psi (207 kPa) to Plywood, OSB, Glass Mat Faced Gypsum sheathings

* Note: Sto Gold Fill testing with Sto Detail Mesh reinforcement

Table 2 EIFS Weather Resistance and Durability Performance*

TEST	METHOD	CRITERIA	RESULTS
1. Accelerated Weathering	ASTM G 153 (Formerly ASTM G 23)	No deleterious effects* at 2000 hours when viewed under 5x magnification	Pass
2. Accelerated Weathering	ASTM G 154 (Formerly ASTM G 53)	No deleterious effects* at 2000 hours	Pass
3. Freeze/Thaw Resistance	ASTM E 2485	No deleterious effects* at 10 cycles when viewed under 5x magnification	Pass
4. Water Penetration	ASTM E 331 (modified per ICC-ES AC 235)	No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes at 6.24 psf (299 Pa) or 20% of design wind pressure, whichever is greater	Pass at 12.0 psf (575 Pa) after 30 minutes
5. Drainage Efficiency	ASTM E 2273	90% minimum	> 90%
6. Tensile Adhesion	ASTM E 2134	Minimum 15 psi (103kPa) tensile strength	Pass
7. Water Resistance	ASTM D 2247	No deleterious effects*at 14 day exposure	Pass @ 28 days
8. Salt Spray	ASTM B 117	No deleterious effects* at 300 hours	Pass @ 300 hrs
9. Abrasion Resistance	ASTM D 968	No cracking or loss of film integrity at 528 quarts (500 L) of sand	Pass @ 528 quarts (1000 L)
10. Mildew Resistance	ASTM D 3273	No growth supported during 28 day exposure period	Pass @ 28 days

TEST	METHOD	CRITERIA	RESULTS
11. Impact Resistance	ASTM E 2486	Level 1: 25-49 in-lbs (2.83-5.54J) Level 2: 50-89 in-lbs (5.65-10.1J) Level 3: 90-150 in-lbs (10.2-17J) Level 4: >150 in-lbs (>17J)	Pass with one layer Sto Mesh Pass with two layers Sto Mesh Pass with one layer Sto Intermediate Mesh Pass with one layer Sto Armor Mat and one layer Sto Mesh

* No deleterious effects: no cracking, checking, crazing, erosion, rusting, blistering, peeling or delamination

Table 3 Air/Moisture Barrier and EIFS Fire Performance

TEST	METHOD	CRITERIA	RESULT
1. Fire Endurance	ASTM E 119	Maintain fire resistance of existing rated assembly	Pass (4 inch [102 mm] maximum allowable insulation thickness)
2. Intermediate Scale Multi-Story Fire Test	NFPA 285 (formerly UBC Standard 26-9)	1. Resistance to vertical spread of flame within the core of the panel from one story to the next 2. Resistance to flame propagation over the exterior surface 3. Resistance to vertical spread of flame over the interior surface from one story to the next 4. Resistance to significant lateral spread of flame from the compartment of fire origin to adjacent spaces	Pass with 12 inches (305 mm) insulation
3. Radiant Heat Ignition	NFPA 268	No ignition @ 20 minutes	Pass with 1 and 12 inches (25 and 305 mm) insulation
4.Surface Burning (individual components)	ASTM E 84	Individual components shall each have a flame spread of 25 or less, and smoke developed of 450 or less	Flame Spread: < 25 Smoke Developed: < 450

Table 4 EIFS Component Performance

TEST	METHOD	CRITERIA	RESULT
1. Alkali Resistance of Reinforcing Mesh	ASTM E 2098	Greater than 120 pli (21 dN/cm) retained tensile strength	Pass
2. Requirements for Rigid PVC Accessories	ASTM D 1784	Meets cell classification 13244C	Pass

1.6 Quality Assurance

A. Manufacturer Requirements

1. Member in good standing of the EIFS Industry Members Association (EIMA)

2. Air/moisture barrier and EIFS manufacturer for a minimum of thirty (30) years
3. Manufacturing facilities ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System

B. Contractor Requirements
1. Engaged in application of similar systems for a minimum of three (3) years
2. Knowledgeable in the proper use and handling of Sto materials
3. Employ skilled mechanics who are experienced and knowledgeable in air/moisture barrier and EIFS application, and familiar with the requirements of the specified work
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications

C. Insulation Board Manufacturer Requirements
1. EPS board listed by an approved agency
2. EPS board manufactured under Sto licensing agreement and recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements
3. EPS board labeled with information required by Sto, the approved listing agency, and the applicable building code.

D. Mock-up Testing
Construct full-scale mock-up of typical air/moisture barrier and EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, ASTM E 331 and ASTM E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.

E. Inspections
1. Provide independent third party inspection where required by code or contract documents
2. Conduct inspections in accordance with code requirements and contract documents

1.7 Delivery, Storage And Handling
A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product

B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.

C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.8 Project/Site Conditions
A. Maintain ambient and surface temperatures above 40°F (4°C) during application and drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS products

B. Provide supplementary heat for installation in temperatures less than 40°F (4°C)

C. Provide protection of surrounding areas and adjacent surfaces from application of products

1.9 Coordination/Scheduling

A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches (150 mm) or as required by code

B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and moisture barrier

C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall

D. Install window and door head flashing immediately after windows and doors are installed

E. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior

F. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter tracks, and similar details to form a shingle lap that directs incidental water to the exterior

G. Install copings and sealant immediately after installation of the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface

H. Schedule work such that air/moisture barrier is exposed to weather no longer than 30 days

I. Attach penetrations through the EIFS to structural support and provide water tight seal at penetrations

1.10 Warranty

Provide manufacturer's standard warranty.

2.0 - PRODUCTS

2.1 Manufacturers

A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier

B. The following are acceptable manufacturers: (Basis of Design)
Sto Corp. – Air/Moisture Barrier, EIFS
Plastic Components, Inc. – EIFS Accessories

C. Other manufacturers shall submit product data to Architect at least 10 days prior to bid. Comply with Section 01360 - Product Substitution. Acceptance will be in writing via Addendum.

2.2 Air/Moisture Barrier

A. Joint Treatment, Rough Opening Protection, and Detail Components:

1. One component rapid drying gun-applied rough opening protection for frame and CMU walls without mesh or fabric reinforcement. Also use as a joint treatment for sheathing when used with Mesh. Also used to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in air barrier materials

B. Waterproof Coating: – ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing

C. Transition Membrane:– flexible air barrier membrane for continuity at transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions, floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.

2.3 Adhesive

A. Factory blended one-component polymer-modified portland cement based high build adhesive

2.4 Insulation Board

A. EPS Insulation Board: nominal 1.0 lb/ft^3 (16 kg/m^3) Expanded Polystyrene (EPS) insulation board in compliance with ASTM E 2430 and ASTM C 578 Type I requirements and listed, labeled, and furnished in accordance with this specification.

2.5 Base Coat

A. Waterproof Base Coat

Sto Flexyl – fiber reinforced acrylic based waterproof base coat mixed with portland cement (for use as a waterproof base coat over Sto BTS Plus or BTS Xtra for foundations, parapets, splash areas, trim and other projecting architectural features)

2.6 Reinforcing Meshes

A. Standard Mesh - nominal 4.5 oz/yd^2 (153 g/m^2), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials

2.7 Primer

A. Acrylic based tintable primer with sand for roller application

2.8 Finish Coat

Stolit® Lotusan® – acrylic based textured wall finish with graded marble aggregate and self-cleaning properties

2.9 Job Mixed Ingredients

A. Water – clean and potable

B. Portland cement – Type I, Type II, or Type I-II in conformance with ASTM C 150

2.10 Accessories

A. Starter Track – rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., 9051 NW 97th Terrace, Miami, FL 33178 (800 327 – 7077).

B. Mesh Corner Bead Standard – one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.

C. Drip Edge Profile - one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return

2.11 Mixing

A. Adhere to all Manufacturers mixing and installation instructions.

B. Mix with a clean, rust-free high-speed mixer to a uniform consistency

C. Limit addition of water to amount needed to achieve the finish texture.

D. Mix only as much material as can readily be used.

E. Do not use anti-freeze compounds or other additives

3.0 - EXECUTION

3.1 Acceptable Installers

A. Must conform to Quality Assurance requirements of this specification.

3.2 Examination

A. Inspect concrete and masonry substrates prior to start of application for:

1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances
2. Surface absorption and chalkiness
3. Cracks—measure crack width and record location of cracks
4. Damage and deterioration such as voids, honeycombs and spalls
5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage
6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane)

B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:

1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177
2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E 30
3. Cementitious sheathing – consult manufacturer
4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional
5. Fasteners seated flush with sheathing surface and not over-driven

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.3 Surface Preparation

A. Remove surface contaminants on concrete, concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces

B. Repair cracks, spalls or damage in concrete and concrete masonry surfaces and level concrete and masonry surfaces to comply with required tolerances

C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness

D. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material

E. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement

F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details)

G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing.

3.4 Installation

A. Air/Moisture Barrier Installation over Exterior or Exposure I Wood-Based Sheathing (Plywood and OSB), Glass Mat Faced Gypsum Sheathing in Compliance with ASTM C 1177, and Concrete, or Concrete Masonry (CMU) Wall Construction

1. Transition Detailing with Transition Membrane:
At floor line deflection joints up to 1 inch (25 mm) wide, and static joints and transitions such as: sheathing to foundation, dissimilar materials (i.e., CMU to frame wall), flashing shingle-lap transitions, and wall to balcony floor slab or ceiling:
   a. Apply waterproof coating (Sto Gold Coat) liberally to properly prepared surfaces with brush, roller, or spray.
   b. Place pre-cut lengths of Transition Membrane centered over the transition in the wet coating. At changes in plane crease the membrane and similarly place the membrane material in the wet coating. At floor line deflection joints achieve a slightly concave profile (recessed into the joint) of the membrane.
   c. Immediately top coat the membrane with additional coating and apply pressure with brush or roller to fully embed the membrane in the coating and achieve a smooth and wrinkle-free surface without gaps or voids.
   d. Apply coating liberally along all top horizontal edges on walls and along all edges on balcony floor slabs to fully seal the edges.
   e. Overlap minimum 2 inches (51 mm) at ends and adhere lap seams together with coating. Shingle lap vertical seams and vertical to horizontal intersections with minimum 2 inch (51 mm) overlap.

B. At movement joints up to 1 inch (25 mm) wide with up to + 50% movement such as masonry control joints, and through wall joints in masonry or frame construction:
   1. Insert backer rod sized to friction fit in the joint (diameter 25% greater than joint width).
   2. Recess the backer rod ½ inch (13 mm).
   3. Apply the waterproof coating liberally to properly prepared surfaces with brush, roller, or spray along the outer surface on each side of the joint (not in the joint).
   4. Immediately place the membrane by looping it into the joint against the backer rod surface to provide slack.
   5. Embed the membrane in the wet coating along the outer surface on the sides of the joint by top coating with additional coating material and applying pressure with a brush or roller.

C. For all applications, after the membrane installation is complete and the waterproof coating is dry:
   1. Apply a final liberal coat of the waterproof coating to all top horizontal edges on walls to ensure waterproofing integrity. Similarly apply coating at all edges on balcony floor slabs.
   2. Inspect the installed membrane for fish mouths, wrinkles, gaps, holes or other deficiencies. Correct fish mouths or wrinkles by cutting, then embedding the area with additional coating applied under and over the membrane.
   3. Seal gaps, holes, and complex geometries at three dimensional corners with StoGuard, RapidFill or StoGuard RapidSeal.

D. Transition Detailing with StoGuard RapidFill
At flashing shingle laps, and through wall penetrations such as pipes, electrical boxes, and scupper penetrations:
   1. Flashing leg or penetration flange must be seated flat against the wall surface without gaps. Apply StoGuard RapidFill liberally with a caulking gun in a zig-zag pattern across the flashing leg or flange/wall surface seam and spread to a thickness that covers the flange and fastener penetrations and directs water away from the wall. Extend application minimum 1 inch (25 mm) onto both surfaces (flashing leg/flange and wall surface).
   2. At through wall penetrations without flanges ensure the penetrating element (i.e., pipe or scupper) is fitted snug against abutting wall surfaces. Apply a fillet bead with a caulking gun around the penetration and tool against both surfaces (penetration and wall surface) to create a bead profile that directs water away from the penetration. Extend application minimum 1 inch (25 mm) onto both surfaces.

E. Rough Opening Protection
   1. Apply a generous bead of sealant with a caulking gun in a zig-zag pattern along the inside and outside surface of the rough opening. 2. Spread with a 6 inch (152 mm) wide plastic drywall knife all the way around the opening.

F. Sheathing Joint Treatment
   1. Fill with Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread with a trowel to create a smooth surface that completely covers the mesh.

G. Air/Moisture Barrier Coating Installation

1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat. Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
2. OSB Sheathing: apply waterproof coating by spray or with a ¾ inch (19 mm) nap roller to sheathing surface to a uniform wet mil thickness of 10 mils. Protect rough openings, joints, and parapets (Paragraph 3.04D), then apply a second coat of waterproof coating.
3. CMU Surfaces:
    a. Repair static cracks up to 1/2 inch (13 mm) wide with StoGuard RapidFill. Rake the crack with a sharp tool to remove loose or friable material and blow clean with oil-free compressed air. Apply the crack filler with a trowel or putty knife over the crack and tool the surface smooth. Protect repair from weather until dry.
    b. Liberally apply two coats of Sto Gold Coat to the surface with a ¾ inch nap roller or spray equipment to a minimum wet thickness of 10 – 30 mils each, depending on surface condition. Additional coats may be necessary to provide a void and pinhole free surface. Protect from weather until dry.

3.5 EIFS Installation

A. Starter Track
1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
2. Attach the starter track even with the line into structural supports with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) and three thread penetration, galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration, and corrosion resistant concrete or masonry screws with minimum 1 inch (25 mm) penetration for concrete or CMU. Attach between studs into blocking as needed to secure the track flat against the wall surface. Attach at maximum 16 inches (406 mm) on center into framing. For solid wood sheathing or concrete/masonry surfaces, attach directly at 12 inches (305 mm) on center maximum.
3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS insulation board to be seated inside of track) and abut.
4. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing (refer to Sto Details).

B. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors

Starter Track, Window/Door Head Flashing, Floor Line Flashing, and Roof/Side Wall Step Flashing: Install minimum 4 inch (100 mm) wide detail component over back flange of starter track, floor line flashing, head flashing, and roof/side wall step flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.

C. Backwrapping

Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed (paragraph 3.04 G1). Alternatively, pre-wrap terminating edges of insulation board.

D. Adhesive Application and Installation of Insulation Board

Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination.

1. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.
2. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. *(Note: rasping prevents an outward bow at the Starter Track).*
3. Use either polyurethane spray foam adhesive or cementitous adhesive: Cementitious Adhesive : apply adhesive to the back of the insulation board with the proper size (1/2 x ½ x 2 inch [13 x 13 x 51 mm]) stainless steel notched trowel. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive uniformly so ribbons of adhesive do not converge. Immediately place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply firm pressure over the entire surface of the boards to ensure uniform contact of adhesive. IMPORTANT: do not delay installation once adhesive is applied. If adhesive “skins” remove it and apply fresh adhesive.
4. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.
5. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
6. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
7. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the spray foam adhesive dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.

E. Slivering and Rasping of Insulation Board Surface

1. Make sure insulation boards are fully adhered to the substrate before proceeding.
2. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
3. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.

F. Trim, Reveals and Projecting Aesthetic Features

1. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).

2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
4. Do not locate reveals/aesthetic grooves at high stress areas.
5. Ensure minimum ¾ inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.

G. Completion of Backwrapping

Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.

H. Accessory Installation

1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh “tail” from one piece onto the next piece. Fully embed the accessory and mesh “tail” in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner.
2. Drip Edge: install the drip edge accessory prior to application of field mesh (paragraph 3.4.2 I5 below). Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

I. Base Coat and Reinforcing Mesh Application

1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.

3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
4. Ultra-High impact mesh application (recommended to a minimum height of 6'-0" [1.8 m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately ⅛ inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-½ inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used – see NOTE to paragraph 3.4.2 H1 above).Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.
6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-½ inches (65 mm).
7. Allow base coat to thoroughly dry before applying primer or finish.

J. Primer Application
1. Ensure the base coat surface is free of surface contamination before commencing the primer application.
2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.

K. Finish Coat Application
1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.
2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
    a. Avoid application in direct sunlight.
    b. Apply finish in a continuous application, and work to an architectural break in the wall.
    c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
    d. Do not install separate batches of finish side-by-side.
    e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.

f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.6 Protection

A. Provide protection of installed materials from water infiltration into or behind them

B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry

3.7 Cleaning, Repair And Maintenance

A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This section covers the pre-finished, pre-fabricated Architectural metal soffit panel system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.
B. Drawings and general provisions of the Contract, including general and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 SUMMARY

A. Section Includes
   1. Factory formed metal wall panels
B. Related work specified elsewhere (Note: select from the below or add appropriate sections)
   1. Flashing and Trim: Division 7- Flashing and Sheet Metal
   2. Sealants: Division 7 Joint Sealers Sections

1.3 DEFINITIONS

A. Metal Wall Panel Assembly: Metal soffit panels, attachment system components, miscellaneous metal framing, thermal, and accessories necessary for a complete weathertight system.

1.4 QUALITY ASSURANCE

A. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.
B. Sheet Metal Industry Standard: Comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) *Architectural Sheet Metal Manual.*
C. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

1.5 SUBSTITUTIONS

A. The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

1.6 SYSTEM DESCRIPTION

A. Material to comply with:
   1. ASTM A792/A792M Standard Specification for Sheet Steel, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip process

1.7 SOFFIT PANEL SYSTEM PERFORMANCE TESTING

A. General Performance: Metal soffit panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
B. Panels to meet:
   1. Metal Soffit System shall be designed to meet applicable Local Building Code and the Soffit System shall have been tested by the Manufacturer per

ASTM E-330 and have the applicable Load Tables published from this Air Bag testing for negative loads.

1.8 WARRANTIES

A. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finish within specified warranty period.
   1. Exposed Panels Finish - deterioration includes the following:
      a. Color fading more than 5 hunter units when tested according to ASTM D 2244
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
      c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
   2. Warranty Period: 20 Years from the date of substantial completion

B. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition

1.9 SUBMITTALS

A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.
B. Provide finish samples of all colors specified.
C. Shop drawings: Show fabrication and installation layouts of metal soffit panels or metal soffit panels, details of edge conditions, panel profiles, corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work
D. Coordination Drawings: Plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installer of the items involved.
E. LEED Submittals
   1. Product data for Credit MR 4.1 and credit MR 4.2: Indicating the percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.

1.10 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.
B. Deliver components, sheets, metal wall panels and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
C. Unload, store and erect metal wall panels in a manner to prevent bending, warping, twisting and surface damage.
D. Stack metal wall panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness. Do not store metal wall panels in contact with other materials that might cause staining, denting or other surface damage.
E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.11 PROJECT CONDITIONS

A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal wall panel work to be performed.
B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PANEL DESIGN

A. General: Provide factory-formed metal wall panels designed for soffit applications where a flush or flat appearance is desired. A round interlock leg and concealed fastening system act to improve the flush appearance while providing additional strength.
B. Wall panels shall be Flush Wall 11" widths with 1" height.
C. Panels to be produced Smooth - Factory Standard. Specifier note: Factory standard is smooth unless specified. Specifier Note: Depending on producing factory, panels may be specified with venting strips or perforated, aluminum panels only, for soffit applications. Check with local factory for capabilities.
D. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.

2.2 ACCEPTABLE MANUFACTURERS

A. This project is detailed around the metal wall product of Petersen Aluminum Corp, Acworth, GA, 800-272-4482Petersen Aluminum Corp, Phoenix, AZ, 833-750-1935 Flush Wall
B. Or pre-approved equal

2.3 MATERIALS AND FINISHES

A. Preformed metal panels shall be fabricated of 24 GA and shall be Herr-Voss corrective leveled for flat appearance.
B. Color shall selected from all available manufacture option
   1. Color to be selected by owner and architect during the submittal process

C. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.
D. If Strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation.
E. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.

F. Accessories/Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the wall panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity

G. Substrate shall be as noted on the structural drawings

H. Sealants
   1. Provide two-part polysulfide class B non-sag type for vertical and horizontal joints or
   2. One part polysulfide not containing pitch or phenolic extenders or
   3. Exterior grade silicone sealant recommended by roofing manufacturer or
   4. One part non-sag, gun grade exterior type polyurethane recommended by the roofing manufacturer.

2.4 FABRICATION

A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.

B. Fabricate components of the system in factory, ready for field assembly.

C. Fabricate components and assemble units to comply with fire performance requirements specified.

D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine alignment of structural steel and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation.

B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FASTENERS

A. Secure units to supports.

B. Place fasteners as indicated in manufacturer's standards.

3.3 INSTALLATION

A. Compliance: Comply with manufacturer's product data, recommendations and installation instructions for substrate verification, preparation requirements and installation.

B. Panels shall be installed plumb and true in a proper alignment and in relation to the structural framing. The erector must have at least five years successful experience with similar applications.

C. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation.

D. Provide uniform, neat seams.

E. Fasteners: Conceal fasteners where possible in exposed work. Cover and seal fasteners and anchors for watertight and leakproof installation.

F. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

3.4 DAMAGED MATERIAL

A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

3.5 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damage installed products. Clean installed products in accordance with manufacturer's instruction prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 07540 – THERMOPLASTIC POLYOLEFIN (TPO) ROOFING SYSTEM

1.0 - GENERAL

1.1 Description

A. The work of this section consists of providing TPO Adhered Roofing System as outlined below:
   1. Sure Weld 60 Mill TPO adhered.
   2. ½" Coverboard adhered in Low-Rise Foam
   3. ¼" Tapered insulation if required for positive slope
   4. R-25 min ISO

1.2 Scope Of Work

A. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of the .060" thick (white, gray or tan color as selected by Architect) reinforced TPO (Thermoplastic Polyolefin) reinforced membrane Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details to meet performance criteria specified herein.

B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.

C. The roofing contractor shall confirm all given information and advise the Architect, prior to bid, of any conflicts that will affect their cost proposal.

D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturers must submit for pre-approval in writing ten (10) days prior to the bid date. Comply and submit in accordance with Section 01360.

1.3 Submittals

A. Prior to starting work, the roofing contractor must submit the following:

   1. Shop drawings showing layout, details of construction and identification of materials.
   2. A sample of the manufacturer's Membrane System Warranty.
   3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
   4. Attachment pattern for insulation and membrane to comply with wind zone requirements.

B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the Architect prior to the issuance of the manufacturer's warranty.

C. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with performance requirements specified in "Performance Requirements" Article.
   1. Submit evidence of meeting performance requirements.

2. Submit signed approval of project drawings and specifications meeting manufacturer's requirements for specified manufacturer's warranties.
3. Submit evidence of Installer/contractor meeting requirements for specified warranties.
4. Contractor to register roofing project with the manufacturer prior to the pre-roofing conference and prior to submitting shop drawings. As part of the submittals package, copy of the acknowledgement of the manufacturer is required.

Note: Copy of Acknowledgement Letter from manufacturer that project has been registered shall be included with submittals and prior to pre-roofing conference.

A **minimum** of three (3) field inspections shall be made by a technical (non-sales) representative of the Roofing System Manufacturer at start, mid-way and upon completion of the work. Written reports shall be made and copies of these reports must be submitted to the Architect within 3 days of the inspections. These inspections must be made by a manufacturer's representative employed by the manufacturer. Notify Architect 72 hours prior to inspections.

1.4 Product Delivery, Storage and Handling

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

B. Comply with the manufacturer's written instructions for proper material storage.

1. Store membrane in the original undisturbed plastic wrap in a cool, shaded area. Membrane that has been exposed to the elements for approximately 7 days must be prepared with Weathered Membrane Cleaner (or other Manufacturer's recommended product) prior to hot air welding.
2. Store curable materials (adhesives and sealants) between 60F and 80F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60F minimum temperature before using.
3. Store materials containing solvents in dry, well-ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

C. Insulation must be on pallets, off the ground and tightly covered with waterproof protective materials.

D. Any materials which are found to be damaged shall be removed and replaced at the contractor's expense.

1.5 Work Sequence

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.

B. Do not disrupt activities in occupied spaces.

1.6 Site Conditions

A. If discrepancies are discovered between the actual conditions and those noted on the drawings, immediately notify the Architect in writing. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.7 Pre-Roofing Conference

A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of roofing system installation and associated work.

Require attendance of installer of each component of associated roofing work, Contractor, Architect, Owner, Alabama Construction Management, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:

1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
2. Review roofing system requirements (drawings, specifications and other contract documents).
3. Review required submittals both completed and yet to be completed.
4. Review the construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
5. Review required inspection, testing, certifying and material usage accounting procedures.
6. Discuss weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
7. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.

B. The Architect will record the proceedings and distribute them to the participants for record.

C. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner and Architect.

D. The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty is not provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled. Alabama language required.

1.8 Job Site Protection

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application. **Do not store roofing materials on the roof.**

B. During the roofing contractor's performance of the work, the owner will continue to occupy the existing adjacent building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may shift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary, temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.

C. Do not overload any portion of the building, by either use of or placement of equipment, storage of debris, or storage of materials.

D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

E. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.

F. Store moisture susceptible materials above ground and protect with waterproof coverings.

G. Remove all traces of piled bulk material and return the job site to its original condition upon completion of the work.

1.9 Safety

A. The contractor shall be fully responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. Safety shall be the responsibility of the contractor. All related personnel shall be instructed daily to be mindful of the full-time requirement to maintain a safe environment for the facility's occupants, including staff, visitors, workers and the occurrence of the general public on or near the site.

1.10 Workmanship

A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the Owner’s satisfaction.

C. There shall be a supervisor on the job site at all times while work is in progress.

D. The contractor shall be responsible for weathertightness under this section.

1.11 Quality Assurance and Performance Requirements

A. The membrane roofing system must achieve a UL Class A and FM1-90 or higher rating (No exceptions). Provide additional materials or higher quality to meet
   a. FM-I-90
   b. Severe Hail (SH) requirements
   c. Wind speed requirements (Risk Category 3)
      (Architect to select needed design speed)
      - 120 mph Design Wind Speed

B. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

C. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer.

D. All roofing materials shall be new and provided by same source as required to comply with manufacturer's system warranty.

E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified including operation of hot air welding equipment and power supply. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.

F. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the Architect. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the Architect's consideration.

G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the Architect seventy-two (72) hours prior to the manufacturer's final inspection.

H. FMG Listing: Provide roofing membrane, base flashings, and component materials that meet the requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

   1. Hail Resistance: Severe Hail (SH)

I. Membrane Roofing System must meet or exceed impact resistance requirements of IBC 2021 Section 1504.7 and Wind Speed Requirements as applicable to the Zone where the Building is located as required by the IBC 2021Edition.

J. Certification of Roofing System
Contractor(s), Roofing Material Manufacturer, and Roofing Material Manufacturer's Field Inspector shall each execute the Certification of Roofing System, a copy of which immediately follows this Section.

K. Product must meet Testing requirements of ASTM D5019, "Standard Specification for Reinforced Non-Vulcanized Polymeric Sheet Used in Roofing Membrane"

1.12 Job Conditions and Special Handling

A. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.

B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

C. When loading materials onto the roof, the Authorized Roofing Applicator must comply with the requirements of the Owner/Architect to prevent overloading and possible disturbance to the building structure.

D. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.

E. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.

F. Provide protection, such as 3/4-inch-thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters. Remove debris and loose fasteners promptly.

G. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

H. New roofing installation shall be complete and weather tight at the end of each workday.

I. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.13 Warranty

A. Provide manufacturer's special 20-year weathertightness No Dollar Limit (NDL) Roofing System Warranty with:
   a. Hail Resistance: Severe Hail (SH) No exclusions for 2” hail.
   b. Edge to Edge Warranty (Pre-Fabricated Edge Metal to be included)
   c. Warranted speed and uplift resistance:

      i. 120 mph Wind Rider

B. Pro-rated System Warranties shall not be accepted.

C. The roof and associated work shall be guaranteed by the General Contractor against leaks from faulty or defective materials and workmanship for a period of

five (5) years, starting on the date of acceptance of the project by the Owner.

D. Manufacturer's roofing guarantees shall contain language regarding the governing of the guarantee by the State of Alabama, otherwise amend the requirement and state that the Laws of the State of Alabama shall govern all such guarantees.

E. Roofing Installers Warranty: Submit roofing Installer's warranty on Installers letterhead, signed by Installer, covering all work of this contract, including incidental items, for the following warranty period:

Warranty Period: Five (5) years from date of Substantial Completion.

F. State of Alabama General Contractor's Roof Guarantee: Covering Work of this Section, including all components of the roofing system for the following warranty period:

Warranty Period: Five (5) years from date of Substantial Completion.

G. All warranties shall be dated within 30 days of substantial completion.

H. The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty is not provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.

2.0 - PRODUCTS

2.1 General

A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

1. Carlisle SynTec, Incorporated. (60 mil)

2. Johns Manville (60 mil)

4. GAF (60 Mill)

B. All products (including insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the system warranty.

2.2 Membrane

Provide 60 mil thick reinforced TPO (Thermoplastic Polyolefin) membrane as needed to complete the roofing system. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal 15 mil thick. Color to be selected by Architect.

2.3 Insulation/Underlayment/Coverboards

A. When applicable, insulation shall be installed in multiple layers. The first and second layers of insulation shall be mechanically fastened to the substrate in accordance with the manufacturer's published specifications.

B. Insulation shall be as indicated. ASTM C1289 Type II, Class 1, Grade 2 (20 psi)

C. Coverboard (5/8" SecuRock,5/8" Densdeck,)

2.4 Adhesives and Cleaners

A. All products shall be provided from approved manufacturer and specifically formulated for the roofing system specified herein.

1. Bonding Adhesive
2. Edge Sealant
3. Sealer: Water Cut-Off Mastic (as recommended by roofing manufacturer)
4. Pocket Sealant: TPO Molded Pocket Sealant (as recommended by roofing manufacturer)
5. Membrane Cleaner

2.5 Fasteners and Plates

A. To be used for mechanical attachment of insulation and to provide additional membrane securement:

1. InsulFast Fasteners**:** A threaded #12 fastener with #3 phillips drive used for insulation attachment into steel or wood decks

2. HP-X Fasteners: A heavy duty #15 threaded fastener with a #3 phillips drive used for membrane or insulation securement into steel, wood plank or minimum 15/32 inch thick plywood when increased pullout resistance is desired

3. Piranha Plates: A 2-3/8" diameter metal barbed fastening plate used with Carlisle HP-X or HP-14-10 Fasteners for membrane securement. This plate can be used for insulation securement

4. Insulation Fastening Plates: a nominal 3-inch diameter plastic or metal plate used for insulation attachment.

2.6 Metal Edging and Membrane Terminations

1. Termination Bar: 1 inch wide and .098-inch-thick extruded aluminum bar pre-punched 6 inches on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.

2. Securedge Coping and Gravel Stop -Snap on edge system consisting of a 24 gauge galvanized metal water dam and 24 gauge steel, Kynar 500 finish. Metal fascia color shall be as designated by the Owner's Representative. ANSI/SPRI ES-1 Certified. Coping FM Approved 1-90. Fascia FM Approved 1-195

3. SecurEdge EX: a metal fascia system with an extruded aluminum anchor bar and 24 gauge galvanized steel fascia. Metal fascia color shall be as designated by the Owner's Representative. ANSI/SPRI ES-1 Certified. 2000 Fascia FM Approved 1-645. 2000 Extended Fascia FM Approved 1-270. 2000 Canted Fascia FM Approved 1-270

2.7 Other Materials

Metal Flashing, specified under Section 07621.

3.0 - EXECUTION

3.1 General

A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, job site considerations and weather restrictions.

B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.2 Insulation Placement and Attachment

A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with the required insulation adhesive or mechanical fasteners as specified in the project drawings per manufacturer’s specification to meet wind zone requirements (FM I-90) and MPH wind speed at roof level. (See performance requirements)

3.3 Membrane Placement and Attachment

A. Position membrane over the acceptable substrate. Fold membrane sheet back lengthwise (onto itself) so half the underside of the membrane is exposed.

B. Apply Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.

2. Fold back the unbonded half of the sheet lengthwise and repeat the bonding procedures.

C. Position adjoining sheets to allow a minimum overlap of 2 inches.

D. Hot air weld the membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.

E. Pull the membrane back along the welded splice so the entire underside of the membrane is exposed once the Hot Air Weld has been completed.

F. Apply Bonding Adhesive to the exposed underside of the membrane sheet and the substrate.

G. Allow adhesive to dry until tacky and roll the membrane into the substrate and brush down the bonded section with a bristle broom following the procedure noted above.

H. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

3.4 Membrane Splicing/Hot Air Welding Procedures

A. Hot air weld the membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam. (Note: When using .060” thick membrane, all splice intersections shall be overlaid with non-reinforced flashing)

B. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).

C. Repair all seam deficiencies the same day they are discovered.

D. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.5 Flashing

A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using reinforced membrane. Non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.6 Walkways

A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing.

B. Hot air weld walkway pads to the membrane in accordance with the manufacturer's specifications.

3.7 Daily Seal

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.8 Clean Up

A. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION

CERTIFICATION OF ROOFING SYSTEM

Project: _____

Architect's Job No: _____ **DCM Project No.** _____

Owner: _____

General Contractor: _____

Roofing Subcontractor: _____

Roofing Material Manufacturer: _____

Roofing Material Manufacturer's Inspector: _____

The undersigned Contractors, Manufacturer Representative and Inspector do hereby state that the Roofing System for the Project identified above has been provided in compliance with all Codes specified and as required by Local and State of Alabama laws and regulations and has been provided in compliance with the specified Performance Requirements**.**

SIGNATURES

General Contractor: _____
Signature Printed Name

Roofing Subcontractor: _____
Signature Printed Name

The Roofing Material Manufacturer further states that the Roofing System Provided by Manufacturer to the Roofing Contractor complies with International Building Code 2021 for the Roofing System that has been installed.

Roofing Material Manufacturer: _____
Signature Printed Name

The Roofing Material Manufacturer's Field Inspector certifies that he/she has made field inspections in the proper number and sequence to assure Roofing Material Manufacturer that the Roofing System supplied has been installed to comply with Manufacturer's installation requirements as well as the 2021 IBC.

Roofing Material Manufacturer's Inspector: _____
Signature Printed Name

1.0 - GENERAL

1.1 Scope

Section includes a complete Architectural Standing Seam Metal Roofing System with preformed and pre-finished standing seam metal roofing panels, underlayment, fasteners, clips, perimeter and penetration flashings, roof curbs, cap flashing, closures, sealant, gutters, downspouts, seam caps, trim, vapor barriers, expansion joint covers, soffit system and miscellaneous accessories required to provide the entire roofing and sheet metal assemblies complete and weathertight as intended by contract documents.

1.2 Related Sections

A. Section 06100 - Rough Carpentry
B. Section 07910 - Caulking and Sealants
C. Mechanical/Plumbing - See Drawings
D. Electrical - See Drawings

1.3 References

A. American Iron and Steel Institute (AISI), Specification for the Design of Cold-Formed Steel Structural Members, (August, 1986).

B. American Institute of Steel Construction (AISC) Manual of Steel Construction, (Current Edition).

C. American Society for Testing and Materials (ASTM):
   1. A446: Specification for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process, structural (physical) property.
   2. A525: Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
   3. A792: Specification for Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   4. E283: Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
   5. E331: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
   1. 1987 Architectural Sheet Metal Manual.

E. Underwriter’s Laboratories (UL) Building Materials Directory:
   1. UL 580: Tests for Wind Uplift Resistance of Roof Materials.

1.4 Quality Assurance

A. Prior to starting work, the roofing contractor must submit the following:
   1. Shop drawings showing layout, details of construction and identification of materials.
   2. A sample of the manufacturer's Membrane System Warranty.
   3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
   4. Attachment pattern for insulation and membrane to comply with wind zone requirements.

B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the Architect prior to the issuance of the manufacturer's warranty.

C. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with performance requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.
2. Submit signed approval of project drawings and specifications meeting manufacturer's requirements for specified manufacturer's warranties.
3. Submit evidence of Installer/contractor meeting requirements for specified warranties.
4. Contractor to register roofing project with the manufacturer prior to the pre-roofing conference and prior to submitting shop drawings. As part of the submittals package, copy of the acknowledgement of the manufacturer is required.

D. Manufacturer Qualifications:
Provide primary roofing material products from a single source including under layments all produced by a single manufacturer. Provide secondary products only as recommended by manufacturer of primary products for use with roofing system specified.

E. Installer's Qualifications: Installer / sub-contractor must be currently in the primary business of roofing with not less than (5) five consecutive years of recorded successful experience with roofing systems comparable to that of this project under the same company name and be **authorized by the roofing material manufacturer as trained and approved for installation** of such roofing materials indicated for this project. Joint ventures shall not be allowed.

F. A full-time field supervisor or foreman with minimum of (5) years of experience in a roofing supervisory role, having performed on projects of comparable scope and type shall be required to be on site at all times during roofing work.

G. The Roofing Contractor shall be responsible for weathertightness of the entire roofing system.

H. The Roofing Contractor shall inspect and accept condition of the roof deck and components of mechanical penetrations prior to installation of the roofing system.

Note: Copy of Acknowledgement Letter from manufacturer that project has been registered shall be included with submittals and prior to pre-roofing conference.

A **minimum** of three (3) field inspections shall be made by a technical (non sales) representative of the Roofing System Manufacturer at start, mid-way and upon completion of the work. Written reports shall be made and copies of these reports must be submitted to the Architect within 3 days of the inspections. These inspections must be made by a manufacturer's representative employed by the manufacturer. Notify Architect 72 hours prior to inspections.

The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty is not provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.

1.5 Pre-Roofing Conference:

A. Prior to roof deck installation, a required Pre-Roofing Conference shall be held as scheduled by Architect upon request by the Contractor. Required attendees include the Owner, Architect, DCM Inspector, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment. Comply with requirements in Division 1.

B. Immediately prior the Roofing installation work, the General Contractor shall hold a subcontractors pre-installation meeting at the site to review matters discussed at the State required Pre-Roofing Conference, methods and procedures related to roofing system including, but not limited to, the following:

1. Review methods and procedures related to roofing installation, including manufacturer's written instructions and warranty requirements.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Examine and accept deck substrate conditions for compliance with requirements, including flatness and fastening.

4. Review structural loading limitations of roof deck during and after roofing.

5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

6. Review governing regulations and requirements for insurance and certificates if applicable.

7. Review temporary protection requirements for roofing system during and after installation.

8. Review roof observation and repair procedures.

1.6 System Description

A. Design Requirements:

1. Architectural Standing Seam Metal Roofing System with continuous, one-piece, preformed, pre-finished, mechanically-seamed, single length roof pans, concealed attachment cleats and other components required for specific project conditions. Sheet steel shall conform to ASTM A792.

2. Formed pre-finished sheet metal flashing, trim, roof drainage systems, curbs, soffit system, etc. to withstand wind loads, structural movement, thermal movement, and exposure to weather without failing, rattling, leaking, fastener disengagement or allowing water infiltration to building interior. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49:

3. Manufacturer is responsible for providing evidence acceptable to Architect that Manufacturer’s specified roof system is capable of meeting thermal, wind uplift and performance requirements specified and as required by all local codes and 2015 International Building Code.

B. Thermal Movement:

1. Completed sheet metal system shall be capable of withstanding expansion and contraction of components cause by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

2. Interface between sheet metal component panels and concealed expansion clip shall provide for applicable thermal movement in each direction along the longitudinal direction.

3. Location and sizes of metal roofing rigid connectors shall be project specific as indicated an Engineer's (registered in the State of Alabama) certification and located on shop drawings.

4. Temperature Change Range: 120 degrees F ambient; 180 degrees F material surfaces.

C. Uniform Wind Load Capacity:

1. Design Loads (Roof Panels and Clips): Pressures are normal to roof surface in accordance with ANSI A58.1. Where load tests are required to certify performance, factor of safety shall be 2.5 on panel buckling or on clip-to-panel connections. For Wind Loads, an allowable increase factor of 4/3 may be employed (this results in net factors of safety of 1.875 on panel bending or clip failure from wind loads). Factor of safety for panel capacity of Live Loads shall be 2.0. Minimum wind speed 120 mph.

2. Roof Panel Clip Requirements: Connection of panel anchor clips to substructure or roof deck system shall be designed to resist loads developed by pressures with proper regard for prying forces and/or bending due to eccentric loading. Performance shall be evaluated at extreme positions of thermal movement. A 1/3 increase in allowable load is permitted for wind pressures. Allowable stresses for design shall be in accordance with specifications in AISI "Cold Formed Steel Design Manual", factor of safety on testing of connections shall be 2.5. Clips shall be double anchored through the deck to prevent rotation.

3. Installed roof system shall carry positive uniform design loads with maximum system deflection of L/180 as measured at rib (web) of panel. Comply with UL 580 / Uplift Rating UL 90. Minimum wind speed 120 mph.

D. Performance Requirements:

1. Underwriter's Laboratories, Inc., (UL), Wind Uplift Resistance Classification For Roof Assembly shall be Class 90, as installed, pursuant to Construction Number 312, 312 with batt insulation, 335, 335-modified, or 403, as defined by UL 580. Certified statements from manufacturer without proper UL Classification will not be acceptable.

2. Completed metal roof system shall have maximum static pressure air infiltration of 0.066 cfm/square feet of roof area with 6.24 psf air pressure differential when tested in accordance with ASTM E283.

3. No uncontrolled water penetration (dynamic pressure), other than condensation, when exposed to dynamic rain at 6.24 psf differential static pressure for not less than five minutes duration, when tested in accordance with ASTM E 1646

4. Calculated pull-out capacities for fasteners shall be certified by registered professional Engineer in the State of Alabama as selected by Owner. Minimum safety factor for anchoring fasteners into metal shall be 2.35. Minimum safety factor for anchoring fasteners into concrete shall be 4.0.

5. Installation shall comply with requirements of: FM I-90, FM Fire/windstorm Classification 1A-90 and FM Severe Hail and 2015 International Building Code Hail Impact and Windspeed. No exclusions for Hail under 2".

6. Entire roofing system and sheet metal assemblies are to be provided in detail for weathertightness under peak weather conditions.

E. Certification of Roofing System

Contractor(s), Roofing Material Manufacturer, and Roofing Material Manufacturer's Field Inspector shall each execute the Certification of Roofing System, a copy of which immediately follows this Section.

1. This certification endorsement by the manufacturer shall assure the Owner/Architect that the materials supplied for this project are in compliance with materials and performances as specified in this section.
2. Field Inspector shall further stipulate by signing the certification that he has inspected the project as required and has found no unresolved issues with installation of the manufacturer's materials as supplied.

1.7 Submittals

A. Shop Drawings: Architectural details show design concept and relationship of roof and sheet metal system to other conditions. It is the responsibility of the Installer to prepare detailed shop drawings that adapt the indicated roof and sheet metal assemblies and configuration to conditions of this Project and specified requirements. Shop drawings shall be reviewed by manufacturer's Technical Department before submittal to Architect. Installer shall recommend and make any detail modifications required by manufacturer to ensure a proper and weathertight system.

1. Show roofing and sheet metal system with flashings and accessories in plan, elevation, sections and details for each type of product indicated.

2. Include metal thicknesses and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Also indicate attachment locations, thermal expansion provisions, and special supports. Submittal shall include manufacturer's written comments, all fastener descriptions and spacing, sealant description and locations, bend radii, metal thicknesses, dimensions of individual components and profiles, and other pertinent information.

3. Indicate relationships with adjacent and interfacing work.

4. Distinguish between factory and field assembly work.

5. Submit erection drawings showing proposed sequence of laying panels. Provide manufacturer's instructions for storage, handling and installation, and their standard construction details for conditions on the Project.

6. Submit documentation that system attachment will meet UL-90 rating for resistance to wind uplift loads.

B. Product Data: Submit manufacturer's detailed material and system description, sealant and closure installation instructions, engineering performance data, and specifications.

C. Submit a sample 16 sq inch (min.) chip of each type of actual material color, complete with factory finish. Architect shall select from industry standard Energy Star Colors.

D. Quality Control Submittals:

1. Design Calculations:
   a. Submit design calculations sealed by registered Engineer in the State of Alabama indicating compliance with specified

performance criteria and certified fastener pullout calculations. Indicate fastener types, spacings and number required for each clip. Pullout calculations shall be for panel clips.

b. Empirical calculations for roof panel and clip-to-panel performance will not be accepted.

2. Test Reports:
   a. Submit reports from independent testing laboratory that bears stamp of Alabama registered Engineer (P.E.) to certify compliance with specified performance criteria.

   b. Each prequalified manufacturer shall provide complete and current data for specified roof system as follows:

      1) Thermal cycle testing of metal roof panels and panel clips as specified.
      2) Uniform ultimate wind uplift load capacity test for metal roof panels as specified.
      3) Ultimate pull-out capacity for panel clips, tested as specified.
      4) UL 90 Classification test data as specified.
      5) Static air infiltration resistance test data as specified.
      6) Water penetration test data as specified.
      7) Fastener pull-out calculations as specified.

E. Submit a sample of Manufacturer's warranties.

1.8 Installer/Manufacturer Quality Assurance

A. Manufacturer: Company specializing in Architectural Sheet Metal Products with fifteen (15) years minimum experience. Being listed as prequalified manufacturer does not release manufacturer from providing complete, current and acceptable test data for each performance, thermal, and wind load requirement specified for specific profile proposed.

B. Comply with SMACNA's "Architectural Sheet Metal Manual, 6th Edition." Any clarifications will be in accordance with this standard. Conform to dimensions and profiles shown unless more stringent requirements are indicated.

C. No product substitutions shall be permitted without meeting specifications. Substitutions shall be submitted 10 days prior to bid date and acceptance put forth in an addendum. **No substitutions shall be made after the bid date**.

D. Installer shall be responsible for material and labor in the form of a single source contract. Split contracts are not acceptable.

E. Installer Qualifications:
   1. Installer must be an Authorized Installer or Licensee, acceptable to roof system manufacturer for the complete finished sheet metal package. Manufacturer will determine initial acceptability of installer's qualifications for specified roof systems.

   2. Installer's primary business must be the installation of roofing systems.

   3. Installer must have minimum of five (5) years of experience installing preformed metal roofing systems.

   4. Installer must have successfully completed minimum of five (5) significant installations of preformed metal roofing systems, including installation of long, field-formed panels. Submit complete description of each previous

project, including name and phone numbers of representatives of the Owner, Architect, Manufacturer and Contractor.

5. Submit name and resume' of installer's proposed job superintendent, including list of similar projects completed by superintendent.

6. Installer must execute 100% of metal roof system installation with installer's own employees.

F. Pre-installation Conference: Conduct required coordination meetings / conferences to comply with requirements of this section and Division 1

G. Manufacturer's Twenty (20) Year Watertightness Warranty:
1. General Contractor shall send drawings to manufacturer for review before bid date to ascertain compliance of materials for accurate bidding purposes.

2. Installer, immediately upon award of bid, shall request application from manufacturer for manufacturer's Twenty (20) Year NDL or equivalent watertightness warranty.

3. Installer shall complete application forms and return to manufacturer with shop drawings for review and approval well in advance of installation date.

4. After completion of project, installer shall submit letter of certification from manufacturer that roof installation is in accordance with approved shop drawings and manufacturer's requirements, and that entire roof installation will be issued specified Twenty (20) Year watertightness warranty.

1.9 Delivery, Storage and Handling

A. Deliver pre-fabricated accessories to Project site in manufacturer's unopened containers.

B. Protect components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.

C. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipping storage and handling.

D. Store materials off ground, providing for drainage, under cover providing for air circulation, and protected from wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances.

E. Handle materials to prevent damage to surfaces, edges and ends of roofing sheets and sheet metal items. Damaged material shall be rejected and removed from site.

F. Protect from wind-related damage. Provide on-site storage, or other acceptable protection prior to installation.

G. Examine materials upon delivery. Reject and remove physically damaged, stained or marred material from Project site.

H. Panels with strippable film must not be stored in the open where exposed to the sun. Strippable film shall be removed only immediately before installation.

1.10 Site Conditions

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for preformed metal roofing system.

B. Protection:

1. Provide protection or avoid traffic on completed roof surfaces.
2. Do not overload roof structure with stored materials.
3. Do not support roof-mounted equipment directly on roofing system.

C. Determine that work of other trades which penetrate roof or is to be made watertight by roof is in place and accepted prior to installation of roofing system. Actual roof penetration shall be located and provided under this section.

1.11 Scheduling

A. Coordinate staging and setup area required for field fabrication equipment provided by metal roofing manufacturer.

B. Provide temporary equipment (cranes, hoists, forklifts) as required.

1.12 Warranties

A. Provide Manufacturer's Premium NDL or manufacturer's equivalent Twenty (20) Year Weathertightness Roofing System Warranty fully executed, fully in force and dated within (30) days of project Substantial Completion. Sample warranty and outline of warranty program shall be submitted and approved prior to Pre-Installation Conference. NOTE: Entire source of material and labor shall be the sole responsibility of one Subcontractor. Split contracts are not acceptable. Warranty shall state:

1. Warranty shall be limited to the value of the installed roof assembly, signed by manufacturer of primary roofing materials and his authorized installer, agreeing to replace/repair defective materials and workmanship as required to maintain roofing system in watertight condition with No Dollar Limit (NDL).

2. Warranty shall not exclude any conditions such as flashing, interior gutters, curbs, penetrations, etc., which are an integral part of the roofing system.

3. Warranty shall include manufacturer approval of shop drawings and at least two (2) job site technical inspections by the manufacturer's field representative.

4. **All warranties shall contain language acknowledging the governing laws shall be according to the laws of the State of Alabama. Manufacturer's roofing guarantees (or warranties) which contain language regarding the governing of the guarantee (or warranty) by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such guarantees (or warranties).**

B. Provide Manufacturer's Premium (20) year Sheet Metal Finish Warranty stating:

1. Architectural coating finish will be Free of fading or color change in excess of 2 NBS units as measured per ASTM D 2244-68.

2. Architectural coating finish will not chalk in excess of numerical rating of 8 when measured in accordance with standard procedures specified in ASTM D 659-74.

3. Architectural coating finish will not peel, crack, chip or exhibit any other mechanical failure of paint to adhere to the substrate.

C. Furnish General Contractor's Five (5) Year Roofing Warranty in compliance with State of Alabama DCM General Roofing Guarantee. All sheet metal flashings, trim and components provided under this section shall be covered under the State of Alabama DCM General Contractor's Roofing Warranty.

D. The Subcontractor shall guarantee in writing all sheet metal roofing work and flashings to remain free from leaks, loosening, excessive buckling, failure to stay in place, and similar defects of materials and workmanship for a period of five (5) years from the date of acceptance of the work.

E. The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty is not provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.

2.0 - PRODUCTS

2.1 Architectural Standing Seam Metal Roofing System

A. Panels shall be pre-finished factory formed 16" wide with 2" high vertical ribs and intermediate symmetrical striations. Vertical side ribs shall be provided continuous to lap, seal and interconnect with adjoining adjacent panels by means of mechanical seaming.

B. Attachment shall be provided by means of double fastened concealed clips at side laps to allow free thermal movement of roof panels over structure within regional temperature ranges.

C. Provide all accessories as required for a complete weathertight system to meet UL I-90 ratings including, but not limited to: clips, cleats, pressure plates and sealant tape. Attachment shall be provided to withstand negative loading.

D. Comply with ASTM E 1514

E. Panels shall be continuous full length, no end laps.

F. Exposed fasteners are not acceptable at eaves, valleys, or anywhere else contiguous to concealed fastener standing seam systems.

G. Substitutions shall fully comply with specified requirements and will be considered by submittal ten (10) days prior to bid date with applicable technical information and sample watertightness warranty.

H. Concealed Continuous Inner Rib:

1. Standing seam metal roof shall be fastened to framing members with concealed anchorage.

2. Concealed anchorage shall accommodate panel movement in each direction longitudinally to adequately accommodate temperature differential and panel movement for this Project.

3. Manufacturer shall design fastener device and spacing of fasteners to maintain required wind uplift resistance at connection.

I. Closures:
Ridge and hip closures shall be factory fabricated from 24 gauge sheet metal matching roof panels. Hip closures shall be field cut. Ridge closures are to be die-formed to match panel configuration.

J. Approved Manufacturers: AIM, Inc. - Architectural Integrated Metals, Inc. , MBCI Morin, ACI Metal Roofing Systems , and Peterson Aluminum (Pac Clad) providing that products meet or exceed these specifications. Other Manufacturers must submit product information in compliance with Section 01360 at least 10 days prior to bid. Other approved manufacturers will be included in Addendum.

2.2 Underlayment

A. Self-Adhering, Elastomeric Sheet: 30 to 40 mils thick minimum, asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer according to application. After installation of underlayment there should be a Maximum exposure of 60 days regardless if manufacturer's product allows for extended exposure.

2.3 Rigid Roof Insulation

A. Provide a 1 " thick layer of polyisocyanurate rigid roof insulation over structural deck system. Stagger joints. Attach as recommended by manufacturer to comply with FM 1-90 and 120 mph wind speed and wind uplift requirements.

2.4 Roof Drainage Accessories

A. Gutters: Fabricate from pre-finished 24 gauge metallic-coated steel to profile indicated, complete with sealed / profiled end pieces, sealed outlet tubes, and other accessories as required. Fabricate in minimum 120-inch- long sections.

1. Gutter Straps: fabricated from 16-gauge galvanized steel, 1 ¼" width, spaced at 30" centers.
2. Gutter Accessories: Fabricate expansion-joint covers, outlet tubes, ends and other gutter accessories from same metal as gutters.
3. Gutter Style: As Indicated on Drawings
4. Expansion Joints: 50 feet o.c. maximum

B. Downspouts: Provide sealed outlet tube at connection to gutter. Fabricate rectangular downspouts from pre-finished 24 gauge metallic-coated steel complete with mitered elbows. Furnish with anchored metal hangers, formed from same material as downspouts.

1. Hangers: Hemmed edges 1 ¼ inch width.

2. Provide one precast concrete splash block or downspout boot as indicated with each downspout.

2.5 Soffit System:

A. General: Factory formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using a system of concealed fasters. Provide all accessories required for a complete and finished installation with continuous "J" closure at soffit panel ends and at perimeter of openings.

B. Aluminum Sheet Material: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operation and structural performances required.
1. Thickness: .032 inch nominal thickness
2. Surface: Smooth, flat finish
3. Exterior finish: Pre-painted Kynar 500 or approved equal
4. Color: To be selected by the Architect

C. Soffit Panels
1. Type: Perforated full vent panels at low eaves and non-perforated at rake eaves
2. Interlocking edges

3. Orientation: Span perpendicular to building face

D. Flashing and Trim: Provide Manufacturer's standard flashing and trim profiles, factory formed with color and finish to match soffit panels

E. Acceptable Manufacture's / Products: Pac-Clad 850

2.6 Sheet Materials

A. Finished steel sheet material shall be 24 gauge Pre-finished Galvalume (Aluminum-zinc alloy-coated steel – "Hot Dipped Process") per ASTM A792/A792M-97a

B. Unfinished steel sheet metal materials shall be Galvalume ASTM 792-86, AZ 55, "Satin Finish.

C. Finished materials shall be provided with 70% Kynar 500 Fluorocarbon coating, applied by the manufacturer on a Continuous Coil Coating Line, with a top side dry film thickness of 0.70 to 0.90 mil over 0.25 to 0.35 mil prime coat, to provide a total dry film thickness of 0.95 to 1.25 mil. Bottom side shall be coated with primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesion, flexibility and longevity as specified by the Kynar 500 finish supplier. Color as selected by Architect.

D. Removable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film shall be removed immediately before installation.

E. Soffit System Material: Aluminum Sheet Coil-coated sheet, ASTM B 209, alloy, 032 inch nominal thickness with temper as required to suit forming operation and structural performances required. Note: only the soffit system shall be of aluminum materials.

2.7 Accessory Materials

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners:
1. Concealed fasteners for standing seam roofing system shall be 300 series alloy stainless steel pancake head, size and spacing per manufacturer's recommendation for installation over rigid insulation/metal deck, to attach to 24 gauge clips spaced per manufacturer's recommendation to comply with FM1-90/ 120 mph wind speed.

2. Miscellaneous fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

a. Exposed Fasteners: Heads matching color of sheet metal by means factory-applied coating.
b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex head washer gasket.
c. Blind Fasteners: Exposed rivets shall be self-plugging type minimum 3/16" diameter 300 series alloy high-strength stainless-steel with stainless-steel stems.
d. Exposed Rivets:
Exposed rivets shall be self-plugging type minimum 3/16" diameter 300 series alloy stainless steel with stainless steel stems.

C. Sealants:

1. Standing Seam Sealant: Factory applied extruded vinyl weather seal.

2. Flashing Sealant: shall be approved equal to Tremco Spectrum 1.

3. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

4. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

5. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

2.8 Fabrication

A. Preformed Roofing Metal Panels:

1. Prefinished 24 gauge, Grade C G-90 galvanized steel panel shall conform to ASTM A446 within acceptable tolerances of ASTM A525 of continuous field formed full lengths.

2. Panels shall have minimum 2" vertical rib height, spaced at 16" o.c.

3. Panels shall be designed as true standing seam shape, requiring no trapezoidal foam closures, plugs or fillers at eaves.

4. Standing seams shall mechanically interlock with concealed anchorage to prevent entrance or passage of water.

5. Seams shall allow anchorage to resist negative loading and allow expansion and contraction of panels due to thermal changes.

6. Integral snap seams which are not mechanically seamed are not acceptable.

7. Standing seams shall contain a factory applied Extruded Vinyl Weather Seal with the continuous inner rib system to prevent siphoning of moisture through the sidejoint seam (vinyl not available with intermittent clip system).

8. Panels shall be fabricated in continuous lengths as required. No horizontal endlap joints shall be permitted in roof panel lengths. Panels shall be full length from peak to eave as indicated.

9. Transverse or endlap seams will not be permitted.

10. Design panels to use concealed fasteners. Exposed fasteners in roofing pans will not be permitted.

11. Standing seam must prevent water capillary action, or otherwise prevent water infiltration.

12. Examine panels as they are formed to ensure panels are being formed within acceptable tolerances.

B. Flashing and Trim:

1. General: Custom / Shop fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of work indicated. Field verify measurements for accurate fit before shop fabrication.

2. Fabricate roofing and related sheet metal work in accordance with accepted shop drawings, manufacturer's recommendations and applicable standards.

3. Provide flashings in minimum 10'-0" sections except as otherwise noted. Form flashing using single pieces for full width. Provide shop fabricated, mitered and joined corners.

4. All exposed adjacent flashing, ridge, and valleys shall be of the same material and finish as the roof panels.

5. All flashings, hem exposed edges on underside 1/4 inch.

6. All roof penetrations shall be flashed by Metal Roofing Contractor/Installer. All circular roof penetrations shall be made of a one piece construction from an EPDM membrane with aluminum base. Roof curbs shall be furnished by Mechanical Contractor and upon acceptance, installed by Roofing Contractor/Installer.

7. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that indicated for each application.

8. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks with exposed edges folded back to form hems.

9. Sheet Metal Accessory Seams: Fabricate nonmoving seams for accessories with soldered flat-lock seams.

10. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

11. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

12. Conceal fasteners and expansion provisions where possible on exposed sheet metal flashing and trim,

13. Concealed cleats: galvanized 20-gauge

14. Equipment support flashing, expansion joint covers, counterflashing, flashing receivers, eave and rake flashing: pre-finished 24-gauge

3.0 - EXECUTION

3.1 Inspection

A. Examine alignment, attachment and placement of building roof structure and substrates before proceeding with installation of preformed metal materials. Substrate to be within 1/4" to true in 20 feet.

B. Examine roof deck before starting installation. Deck must be clear, clean and smooth, free of depressions, waves or projections, dry and must remain dry and free of ice and snow, after roofing application commences.

C. Structural support such as diagonal bracing and connections shall be tightened in place before work can proceed.

D. Field check dimensions and check support alignment with taut string or wire. Support misalignment will cause panel to oil can.

E. Do not proceed with installation until conditions are satisfactory. Notify Architect in writing of unsatisfactory conditions. Commencement of installation of the metal panels indicates acceptance of all roof structure conditions.

3.2 Installation

A. General Installation Requirements:

1. Install roofing and flashings in accordance with accepted shop drawings and manufacturer's product data, within specified tolerances. Minimum standards shall be as established by Sheet Metal & Air Conditioning Contractors' National Association, Inc. (SMACNA) and National Roofing Contractors Association (NRCA).

2. Separate dissimilar metals and masonry or concrete from metals with bituminous coating. Use fasteners with gasket where required to prevent corrosive action between fastener, substrate and panels.

3. Limit exposed fasteners to extent indicated on shop drawings.

4. Anchorage shall allow for temperature expansion and contraction movement without stress or elongation of panels, clips or anchors. Attach clips to structural substrate using fasteners of size and spacing as determined by manufacturer's design analysis to resist specified uplift and thermal movement forces.

5. Coordinate flashing and sheet metal work to provide weathertight conditions at roof terminations. Fabricate and install in accordance with manufacturer's recommendations, accepted shop drawings and applicable standards.

6. Torch cutting or cutting with abrasive tools of sheet metal including roofing, flashing and trim is not permitted.

7. Bed flanges in coating of elastomeric sealant where required for waterproof performance.

8. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal..

9. Install sheet metal flashing and trim in strait line and level indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

10. Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

11. Underlayment: Where installing metal flashing directly on substrates, install a slip sheet of elastomeric underlayment. After installation, underlayment shall not be exposed in excess of 60 days.

B. Preformed Standing Seam Metal Roof Panels:

1. Fasten concealed anchorage with fasteners as recommenced by manufacturer and at spacings as required for wind uplift.

2. Verify with manufacturer locations of fixed connections and expansion connections.

3. Install starter and edge trim before installing roof panels.

4. Remove protective strippable film immediately prior to installation of roof panels.

5. Install panels to either Continuous Rib or Clips per manufacturer's details.

6. Seam Panel sidelaps using power-driven Seamer as recommended by manufacturer to ensure watertightness.

7. Erect metal roofing with lines, planes, rises and angles sharp and true, and plane surfaces free from objectionable wave, warp, dents, buckle or other physical defects with minimum oil canning.

8. Do not allow traffic on completed roof. If required, provide cushioned walk boards.

9. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.

10. Remove and replace any panels or components which are damaged beyond successful repair.

C. Flashing:

1. Provide fascias, soffits, vents and/or coping to shape indicated and/or recommendations for installation of work where not specifically detailed in shop drawings. Set sheet metal items level, strait lined and plumb.

2. Provide concealed fasteners and provisions for expansion wherever possible.

3. Fold back edges of concealed side of exposed edge to form ½" hem.

4. Secure to wood with screws.

5. Seal flashing and trim joints with elastomeric sealant as required for watertight construction.

6. Reglet Flashing: Saw-cut reglets a minimum of one (1") inch deep by one quarter (¼") inch wide into masonry substrate/wall and Insert metal flashings into reglets, anchor with fasteners and wedges and seal joints thoroughly.

7. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

8. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a

minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten

9. Provide breakaway type expansion joint system as indicated above 4 hour walls of same material and finish as roof panels.

10. Set metal already partly formed in place and fasten by means of cleats. Use cleats to keep laps closed when face width exceeds 8".

D. Roof Drainage and Accessories:

1. General: Provide gutters, down pipes and scuppers to shapes indicated and/or required. Systems shall include all items sized as necessary to carry off water to splash blocks or into boots. Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

2. Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored straps maximum 30 inches on center. Provide end closures and seal watertight with sealant. Slope to downspouts.

   a. Front top elevation of gutter shall be installed minimum 1” below front top elevation of low point roof edge attached with loosely lock straps to front gutter bend and anchor to roof edge.
   b. Install gutter with joints not exceeding 50 feet on center to allow for linear expansion with expansion joint caps.

3. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fastener straps designed to hold downspouts securely 1 inch away from walls; locate fastener straps at top and bottom and between approximately 48” inches o.c..

   a. Provide elbows at base of downspout to direct water away from building.
   b. Connect downspouts to underground drainage system where indicated with transition fittings.

4. Expansion-Joint Covers: Install expansion-joint covers where indicated or required to adhere with profiles indicated. Lap joints a minimum of 4 inches (100 mm) in direction of water flow.

5. Down pipe straps shall be 20 gauge metal hangers, 1-1/2" wide anchored into wall each side of down pipe. Straps shall be minimum 8'-0" apart with minimum two per pipe.

6. Provide prefabricated downspout outlet tubes at gutter/downspout intersection for attachment. Seal thoroughly.

7. Provide prefinished rain water diverters at all valley/gutter intersections.

E. Soffit System:

1. General: Install Pre-finished Aluminum Soffit System according to Manufacturers standard instruction to thoroughly eliminate gaps, openings and adhere to design intentions as indicated on the drawings.
   a. Span soffit panels perpendicular to building face

b. Attach to prevent wind damage and allow thermal movement with color matching fasteners.
c. Install to conceal cut edges
d. Touch-up as required to match exposed finish

3.3 Field Quality Control

A. Tolerances:

1. Applicable erection tolerances: Maximum variation from true planes or lines shall be 1/4" in 20'-0", 3/8" in 40'-0" or more.

2. Roof structure and roof system are designed for minimum roof slope of 1/2:12 (refer to roof plans for areas and slope).

B. Manufacturer's Twenty (20) Year Weathertightness Warranty Field Inspections:

1. The manufacturer's factory technician shall inspect the installer's work during the course of the metal roof construction:
   a. First, upon completion of underlayment and trim installation and prior to panel installation.
   b. Second, at the conclusion of the panel installation.

2. The factory technician is to review all details with the Subcontractor's designated superintendent for conformance to the approved shop drawings and the requirements of the weathertightness warranty. Any corrections shall be the responsibility of the installer.

C. Damaged or deteriorated sheet metal material beyond minor repair, shall be subject to rejection and replacement as determined by the Architect.

D. Touch-up exposed fasteners using paint furnished by roofing panel manufacturer and matching exposed panel surface finish.

3.4 Cleaning

A. Clean roof in accordance with manufacturer's recommendations.

B. Clean exposed surfaces immediately upon installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, pieces of flashing and temporary protective film materials. Maintain in a clean condition during construction. Leave and maintain in clean condition. Touch up minor abrasions and scratches in finish per manufacturer's recommendations with touch-up paint supplied by manufacturer.

C. To prevent rust staining and scratches on finished surfaces, immediately remove fillings produced by drilling or cutting.

D. Promptly remove all scrap and construction debris from the site.

3.5 Final Inspection

A. Final inspection will be performed by the Architect with Department of Construction Management (DCM)Inspector. Schedule with the Architect Three (3) weeks in advance.

B. Fully executed roof warranties must be presented at time of Final Inspection.

END OF SECTION

CERTIFICATION OF ROOFING SYSTEM

Project: _____

Architect's Job No: _____ **DCM Project No.** _____

Owner: _____

General Contractor: _____

Roofing Subcontractor: _____

Roofing Material Manufacturer: _____

Roofing Material Manufacturer's Inspector: _____

The undersigned Contractors, Manufacturer Representative and Inspector do hereby state that the Roofing System for the Project identified above has been provided in compliance with all Codes specified and as required by Local and State of Alabama laws and regulations and has been provided in compliance with the specified Performance Requirements**.**

SIGNATURES

General Contractor: _____
Signature Printed Name

Roofing Subcontractor: _____
Signature Printed Name

The Roofing Material Manufacturer further states that the Roofing System Provided by Manufacturer to the Roofing Contractor complies with International Building Code 2021 for the Roofing System that has been installed.

Roofing Material Manufacturer: _____
Signature Printed Name

The Roofing Material Manufacturer's Field Inspector certifies that he/she has made field inspections in the proper number and sequence to assure Roofing Material Manufacturer that the Roofing System supplied has been installed to comply with Manufacturer's installation requirements as well as the 2021 IBC.

Roofing Material Manufacturer's Inspector: _____
Signature Printed Name

SECTION 07700 – EXPANSION JOINT SYSTEMS

1.0 - GENERAL

1.1 Summary

A. This Section includes the following:
   1. Architectural joint systems for building exteriors.

B. Related Sections include the following:
   1. Division 04 Section "Unit Masonry" for masonry wall joint systems.
   2. Division 07 Section "Asphalt Shingle Roofing" for sheet metal roof joint systems.
   3. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal wall joint systems.
   4. Division 07 Section "Fire-Resistive Joint Systems" for liquid-applied joint sealants in fire-resistive building joints.
   5. Division 07 Section "Joint Sealants" for liquid-applied joint sealants.

1.2 References

A. Definitions

1. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
2. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
3. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.
5. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed

1.3 Submittals

1. Shop Drawings: Provide the following for each joint system specified and obtain approval prior to fabrication and shipment of materials to the job site:
2. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
3. Product Data: Submit copies of manufacturer’s latest published literature for materials specified herein for approval and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.
5. Samples for Initial Selection: For each type of joint system indicated.
6. Include manufacturer's color charts showing the standard range of colors and finishes available for each exposed metal and elastomeric seal material.
7. Certificates – Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated

1.4 Quality Assurance

1. Installer Qualifications: Approved by manufacturer and having experience installing joint systems that are similar in design complexity.
2. Source Limitations: Obtain all architectural joint systems through one source from a single manufacturer.
3. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements."
4. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
5. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 and/or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating not less than the rating of adjacent construction.
6. Manufacturer to provide 5-year warranty for all joint covers.

1.5 Delivery, Storage and Handling

A. Store products in accordance with manufacturer’s instructions in weather protected environment, clear of ground and moisture.
B. Keep the Redline Tie-in material dry and free of debris.

1.6 Warranty

A. Provide manufacturer’s highest quality warranty for a minimum of 20 years.

2.0 - PRODUCTS

2.1 Architectural Joint Systems for Building Interiors

A. Basis Of Design: Construction Specialties, Inc. (CSI)
   1. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requests must be reviewed prior to bid and must include the following information:
      a. Details
      b. ASTM- E1399 test reports
      c. Mock-ups
      d. Reference list of projects with similar products as those specified herein.
      e. Sample of written 5 year warranty.

B. Joint Systems:
   1. CSI Model ASM (Vertical Applications); SCW (Horizontal Applications).
   2. Type: Paint Grade; Snap-on cover.
   3. Exposed Metal: Aluminum.
   4. Finish: Class II, clear anodic.
   5. Duroflex Gasket
   6. Single Durometer – 80 Shore A, ASTM D2000
   7. Color: Gray
   8. Fire-Resistance Rating: Provide joint system and fire-barrier assembly with a rating not less than that of adjacent construction.
   9. Vapor Barrier: Manufacturer's standard.
   10. Tamper resistant: no exposed fasteners for tamper proof applications.

2.2 Material

A. Aluminum: ASTM B 221,
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
   2. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
   3. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

B. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations

C. Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
   2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable

3.0 - EXECUTION

3.1 Examination

A. Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

A. Prepare substrates according to architectural joint system manufacturer's written instructions.
B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.
C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.
D. Cast-In Frames: Coordinate and furnish frames to be cast into concrete.

3.3 Installation

A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
   1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
   3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
   4. Locate in continuous contact with adjacent surfaces.

6. Standard-Duty Systems: Shim to level where required. Support underside of frames continuously to prevent vertical deflection when in service.
7. Heavy-Duty Systems: Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.
8. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.

D. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

E. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.

F. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
1. Fire-Resistance-Rated Assemblies: Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.
2. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

H. Vapor barrier: Provide vapor barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

3.4 Protection

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work under this section consists of thru-wall flashing.

1.2 Submittals
Submit for approval all materials proposed for use under this section.

2.0 - PRODUCTS

2.1 Flashing (Masonry)
Flashing shall be Polyvinyl Chloride, 30 mil (.030") waterproof sheeting equal to Wire-Bond or other pre-approved product.

Flashing (Non-Masonry)
Flashing shall be a self-adhering flexible membrane consisting of Elvaloy thermoplastic resin with the following physical properties:

Tensile Strength: 2000 psi per ASTM D412
Ultimate Elongation: 25 percent
Shore A Hardness: 83 per ASTM D 2240
Corners and End Dams; preformed shapes

Acceptable Manufacturers:
Flex Flash – as manufacture by Hohmann & Barnard, Inc. or pre-approved equal.

Surface Adhered Membrane with Drip – as manufactured by Hyload Flashings

DuPont Thru-Wall Flashings – as manufactured by DuPont Chemical Co.

2.2 Adhesive & Primers
Adhesive & primers for bonding and splicing shall be as recommended by the manufacturer of the material used.

3.0 - EXECUTION

3.1 Extent
Wall flashing shall generally be installed continuous at each floor level, over exterior wall openings, under sills, and at other locations as indicated and as required.

3.2 Installation

A. All surfaces to receive the flashing shall be reasonably smooth, free from irregularities and primed as recommended by manufacturers installation instructions. On all masonry surfaces, the flashing shall be laid continuously in a fresh bed of mortar above and below. Only at non-masonry vertical surfaces shall flashing be affixed continuously with adhesive and term bar to hold flashing in place.

B. At grade level floors, thru-wall flashing shall exit finish veneer minimum one course below finish floor and below weep holes.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work under this section consists of caulking and sealants.

1.2 Work Included
See the drawings for all items and places requiring caulking. Completely seal with specified caulking compound joints around door frame and frame base and window frames (inside and outside); all other openings in masonry, concrete, or precast concrete joints in or between precast concrete panels; beneath all exterior thresholds; around plumbing fixtures; all places indicated on the drawings to be caulked; and all other places where caulking is required, whether specifically shown on the drawings or not.

1.3 Submittals
Submit for approval product literature and samples of all materials proposed for use. Colors to be approved in the field by the Architect to match adjacent construction color.

2.0 - PRODUCTS

2.1 Sealant
A. Exterior sealant shall be a gun grade one part silicone compound. Materials shall be Tremco Spectrem 1, Dow Corning No. 790 or Pecora No. 890, color as selected.

B. Primer, if required, for the silicone sealant shall be a quick drying clean primer as recommended by the manufacturer of the material used.

2.2 Caulking
A. Interior caulking compound shall be a paintable, one part, gun grade butyl rubber base material equal to Tremco Tremflex 834 Acrylic, Pecora BC-158 or DAP Butyl Flex or acrylic latex base caulking compound equal to Pecora AC-20 or DAP Latex Caulk.

B. Floor Caulking compound shall be a tintable, semi-self leveling polyurethane base equal to Tremco THC900/901. Colors shall be selected by Architect from manufacturers entire line of colors.

2.3 Fire Caulking
All locations indicated and/or all penetrations or openings into fire barriers shall be sealed with fire caulk material meeting UL requirements for such application. Submit product literature indicating UL compliance for approval. All trades shall use same fire caulk product. Installer shall be certified by the manufacturer.

2.4 Compressible Joint Sealant
Sealant shall be compressible polyurethane foam impregnated with polybutylene, Polytite as manufactured by Polytite Manufacturing Corporation, or other material as approved.

2.5 Filler
Filler shall be polyethylene foam, polyurethane foam, untreated jute, pointing mortar or other oil-free materials subject to approval of the manufacturer of the caulking or sealant compound.

2.6 Accessories

A. Bond breaker shall be polyethylene tape.

B. Solvents, cleaning agents, and other accessory materials shall be as recommended by the sealant manufacturer.

3.0 - EXECUTION

3.1 Joint Preparation

A. Joints deeper than 1/2" shall be built up to a depth of 3/8" below adjacent surfaces with approved filler material prior to applying sealant. All surfaces must be clean and dry. Any protective coating or foreign matter such as oil, dust, grease, dirt, or frost on building materials that will impair bond shall be removed. Masonry and concrete surfaces shall be sound. If required by manufacturer's instructions, apply brush coat of primer to surfaces and allow to dry before applying sealant.

B. At the option of the applicator, the surfaces next to the joints may be masked to obtain a clean neat line. Remove tape immediately after tooling the sealant.

3.2 Application

A. Caulking or sealant shall be used from manufacturer's original cartridge in a standard open type, hand operated caulking gun. Nozzle shall be cut to proper size to obtain a neat, smooth and uniform bead. When handling bulk material, manufacturer's instructions shall be followed.

B. A full bead of caulking or sealant shall be applied into joint under sufficient pressure, drawing nozzle across caulking or sealant to leave a slightly concave surface. Tool with a caulking tool or soft bristled brush moistened with solvent within 10 minutes after exposure. All sealed joints shall be watertight.

C. Joints shall be caulked before painting adjacent work. Do not paint over silicone sealant compound.

D. Fire caulk shall be installed to comply with manufacturer’s requirements, UL requirements, and requirements of authority having jurisdiction.

3.3 Clean-up

On non-porous surfaces, excess uncured caulking shall be immediately removed with a solvent moistened cloth. On porous surfaces, excess caulking should be allowed to cure overnight, then remove by lightly wire brushing or sanding. All adjacent surfaces shall be clean and free from stains.

END OF SECTION

1.0 - GENERAL

1.1 Scope

Furnish and install all hollow metal doors and frames including view windows, as indicated on the drawings and herein specified.

1.2 Submittals

A. Submit shop drawings for approval.

B. Drawings shall show a schedule of openings using architectural opening numbers, all dimensions, jamb and head conditions, construction details, preparations for hardware, gauges, and finish.

1.3 Templates

A. Manufacturer shall obtain templates of all applicable hardware from the Finish Hardware Contractor and make proper provision for the installation of this hardware.

B. Unless otherwise specified in the hardware section of the specifications, hardware locations shall be in accordance with the recommendations of The National Builder's Hardware Association.

1.4 Marking and Storage

Mark each frame for intended location. Store frames off the ground and in a manner to protect them from damage.

1.5 Storage

A. Doors shall be stored in a dry, secure location to prevent exposure to weather and/or moisture.

B. Frames shall be stored off the ground and protected from weather until in place.

2.0 - PRODUCTS

2.1 Door Construction

A. Exterior Doors: Formed up sheets not less than 16 U.S. gauge rigidly connected and reinforced inside with continuous interlocking 20-gauge hat stiffeners, spaced a maximum of 6" apart. Interior Doors: Formed up sheets not less than 18 U.S. gauge rigidly connected and reinforced inside with continuous interlocking 20-gauge hat stiffeners, spaced a maximum of 6" apart. Sound deadening material of rock wool batts, insulites or other standard recognized available sound deadening materials shall be placed between all stiffeners and plates. Honeycomb doors are not acceptable. Suitable provision shall be made to receive glass panels or louvers. Edge seams are to be continuously welded and ground smooth. Bondo seams are not acceptable.

B. Louvers for interior metal doors shall be of sizes and types as indicated, inverted "V" with metal frame overlapping the door face.

C. Louvers for exterior doors shall be of sizes and types as indicated, rainproof, 20 ga. galvanized steel. Provide No. 16 wire mesh screen at inside of louvers.

D. Doors and frames shall be equal to Steelcraft, Curries, Republic or approved equal.

E. Doors shall be coordinated with thresholds specified under FINISH HARDWARE - SECTION 08710 to meet A.D.A. requirements. Doors shall be extended as required to seal against threshold.

F. Non-full height doors such as Toilet Stall Doors shall be provided with an inverted filler cap channel at head to maintain smooth uniformity at top of door surface.

G. Hollow metal doors shall be provided with beveled hinge and lock edges. Bevel hinge and lock door edges 1/8 inch (3 mm) in 2 inches (50 mm).

H. Exterior door face sheets shall be galvannealed steel, level A60 (ASTM A653).

I. Hardware preparation for hollow metal doors: hinge reinforcements shall be minimum 7-gauge x 9" length.

J. Hardware Reinforcements:

1. Hinge reinforcements for full mortise hinges: minimum 7 gage [0.180" (4.7mm)].

2. Lock reinforcements : minimum 16 gage [0.053" (1.3mm)].

3. Closer reinforcements : minimum 14 gage [0.067" (1.7mm)], 20" long.

4. Galvannealed doors: include Galvannealed hardware reinforcements. Include Galvannealed components and internal reinforcements with Galvannealed doors. Close tops of exterior swing-out doors to eliminate moisture penetration. Galvannealed steel top caps are permitted.

5. Projection welded hinge and lock reinforcements to the edge of the door.

6. Provided adequate reinforcements for other hardware as required.

K. Glass moldings and stops (both labeled and non-labeled doors):

1. Fabricate glass trim from 24 gage [.6mm] steel conforming to:
   a. Interior openings ASTM designation A 366 cold rolled steel.

   b. Exterior openings ASTM designation A 924 Zinc-Iron Alloy-Coated Galvannealed steel with a zinc coating of 0.06 ounces per square foot (A60) for exterior openings.

      1) Install trim into the door as a four-sided welded assembly with mitered, reinforced and welded corners.

      2) Trim: identical on both sides of the door.

      3) Exposed fasteners are not permitted. Labeled and non-labeled doors: use the same trim.

      4) Acceptable mounting methods:

a) Fit into a formed area of the door face, not extending beyond the door face, and interlocking into the recessed area.
b) Cap the cutout not extend more than 1/16" [1.6mm] from the door face.

L. Electrical Requirements for Doors:

General: Coordinate electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.

1. Doors with Electric Hinges:

a. General: Furnish conduit raceway to permit wiring from electric door hardware.

b. Hinge Locations: Provide electric hinge at intermediate or center location. Top or bottom electric hinge locations are not acceptable.

c. Refer to 08710 for electrified hardware items.

2.2 Frame Construction

A. Frames shall be of sizes as indicated, completely assembled, buck and frame formed from 14-gauge exterior, 16-gauge interior, steel with 2" face unless otherwise indicated and 5/8", minimum, integral stop. Exterior frames and interior frames at cafeteria, kitchen, locker room and shower areas shall be Galvannealed A60 (ASTM A653).

B. Corners of frames to be mitered and continuously welded. Joints shall be pulled up tight, welded, and ground smooth with faces in correct alignment.

C. Provide adjustable "T" type anchors, three to each jamb; welded angle clips at bottom of frames for anchorage to floor construction; detachable type metal spreaders. Jamb anchors shall be T-shaped and of the same thickness as the metal of the frames. Where "T" anchors are not feasible, provide anchors as required and/or recommended.

D. Machine frames for attachment of hardware, including special reinforcing for extra heavy duty use, drilling, and tapping. Provide mortar tight metal dust boxes in back of lock location.

E. Frames for sidelights shall be integral with door frames; borrowed light window frames and other openings shall be as detailed.

F. Prepare frames for rubber silencers, three for single swing door and two for each pair of doors.

G. Frames not extending to the floor surface shall have a closed welded jamb bottom.

H. Electrical Requirements for Frames:

1. General: Coordination all electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.

a. Provide cutouts and reinforcements required for metal door frame to accept electric components.

b. Frame with Electrical Hinges: Weld UL listed grout guard cover box welded over center hinge reinforcing. Top or bottom hinge locations are not permitted. Contractor to reference 3.01.E, for continuous hinges.

c. Provide cutouts and reinforcements required to accept security system components.

d. Refer to 08710 for electrified hardware items.

2. Provide mortar box, welded in head of door frame at exterior frames for future door contact switch provided by Owner. Size, type, location and conduit requirements to be provided by Owner.

2.3 Labeled Assemblies

A. All openings shall be protected by assemblies which include doors, frames, hardware, closing devices, anchorage, sills, etc. installed in accordance with NFPA Standard "FIRE DOORS and WINDOWS, NFPA 80," as per Standard Building Code.

B. To further clarify the basic requirements and/or the correct method of labeling that will be acceptable; the labels will include, but not be limited to, the following:

1. Labeling of Fire Doors and Frames

All door openings in fire resistive walls and partitions requiring a rating shall be protected by assemblies which include doors, frames, hardware, closing devices, anchorage, sills, etc., installed in accordance with the National Fire Protection Association (NFPA) 80, Standard for “Fire Doors and Fire Windows” and the State Building Code.

To further clarify the basic requirements and the correct method of labeling that will be acceptable to the Division of Construction Management, the labels shall include the following:

a. Accessibility: Each component shall bear a label located to be accessible after installation.

b. Permanence: Each component shall bear a label of a type of material and be so attached that the life of the label and the attachment thereof can reasonably be expected to equal the life of the component to which it is attached. Labels shall be raised or embossed on metal labels or stamped into metal frames. Plastic or paper labels are unacceptable.

c. Legibility: The label design shall be such that it can always be visible and legible and must be clean of any paint or other coverage making the label illegible.

d. Fire Resistance: All approved labels on doors and on frames shall include thereon the fire resistance rating in hours and minutes for which the door or frame is labeled. Labels on frames with transoms or sidelights must identify that the

opening assembly includes same.

e. Other Requirements: The labels or stamps applied to frames must be provided by a manufacturer that has been approved by a laboratory or organization to provide testing and follow-up services for fire-rated opening assemblies.

2. Other Requirements - As directed by the approved laboratory or organization providing testing and follow-up services and labeling.

2.4 Finish

A. Metal doors and frames shall be thoroughly cleaned of dirt, grease, and impurities and shall be bonderized and finished with one coat of baked-on primer ready to receive finish paint.

B. Primer shall be manufacturer's standard in accordance with ASTM B117. **Do not prime paint labels**.

C. Final painting as specified and applied under Painting Section.

3.0 - EXECUTION

3.1 Installation

A. **BITUMINOUS COATING IS TO BE FIELD APPLIED TO THE INSIDE OF FRAMES THAT ARE TO BE INSTALLED IN MASONRY, OR TO BE GROUTED, PRIOR TO INSTALLATION.**

B. Install frames plumb, rigid, and in true alignment; properly brace until built in. Set spreader and attached jambs to floor through floor anchors.

C. In masonry openings, where required, install a second spreader at the mid-height of the door opening, and do not remove until the masonry jambs are in place. Spreader shall be notched wood of approximate jamb width and 1" minimum thickness. Install a minimum of three anchors per jamb to be imbedded in masonry joint as the wall is laid up.

D. Frames shall be grouted solid.

E. Doors shall be rigidly secured in frames, hardware applied, and adjusted to achieve smooth operation without forcing or binding. Doors shall be capable of maintaining any degree of opening.

3.2 Protection

After installation, doors and frames shall be protected from damage during subsequent construction activities. Damaged doors and frames shall be replaced.

END OF SECTION

PART 1 – GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Section Includes

A. Flush Wood doors

B. Factory Glazing for Fire Rated Doors

1.3 Requirements Of Regulatory Agencies

A. Wood Doors and installation shall comply with provisions and standards listed. The latest published edition of each standard applies.

B. ASTM - American Society for Testing and Materials

1. ASTM E 90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements. (All doors tested shall be fully operable.)
2. ASTM E 413-10 - Classification for Rating Sound Insulation.
3. ASTM F 476 Section 18 - Security Test of Swinging Door Assemblies - Door Impact Test

C. ANSI - American National Standards Institute

1. ANSI/DHI A156.115W - Specifications for Hardware Preparation in Wood Doors and Frames.
2. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.
3. ANSI A156.7 - Hinge Template Dimensions.
4. ANSI/HPVA HP-1 Standards for Hardwood and Decorative Plywood
5. ANSI A208.1-Particleboard
6. ANSI A208.2-Medium Density Fiberboard (MDF)
7. ANSI-ASA S12.60 - Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools
8. ANSI/A117.1 – Accessible and Useable Buildings and Facilities

D. ANSI/WDMA – Window and Door Manufacturers Association

1. WDMA I.S. 1A-13, Industrial Standards for Architectural Flush Doors

a. J-1 – Job Site Information “How to Store, Handle, Finish, Install, and Maintain Wood Doors”
b. P-1 – Performance Standards for Architectural Wood Flush Doors
c. T-1 – Test for Telegraphing
d. T-2 – Test for Warp
e. T-3 – Test for Squareness

2. WDMA Test Methods - Provide documentation showing compliance to WDMA performance duty level.

   a. Adhesive Bonding Durability: WDMA TM-6
   b. Cycle Slam: WDMA TM-7
   c. Hinge Loading: WDMA TM-8
   d. Screw Holding: WDMA TM-10

E. Building Code references

1. IBC – 2021 International Building Code
2. NFPA 80 - Standard for Fire Doors and Other Opening Protective's.
3. NFPA 101 – Life Safety Code
4. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and Other Opening Protective's
5. NFPA 252 – Standard Method of Fire Tests of Door Assemblies
6. ANSI/UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies
7. UL 1784 - Air Leakage Tests of Door Assemblies
8. Underwriters Laboratories (UL) - ULI0C Positive Pressure Fire Test of Door Assemblies
9. ITS/WH Certification - Certification Listings for Fire Doors
10. Consumer Products Safety Commission (CPSC) 16 CFR 1201 – Standard for Architectural Glazing
11. US Green Building Council (USGBC)

1.4 Supplier Qualifications

A. The Wood Door Supplier shall maintain at the location which will be managing the project, a credentialed Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) as a full-time employee and member in good standing of DHI - Door Security + Safety Professionals.

B. The Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) shall supervise other individuals employed by the Wood Door Supplier who work on the project and be available throughout the project to meet with the Contractor, Architect or Owner as needed.

C. Supplier shall be experienced and have completed projects with material, design and scope similar to that specified for this project. If requested by the Owner or Architect, submit a list of projects completed in the last five (5) years with the project name, location, Owner, Architect and Contractor.

D. As a requirement, the Wood Door Supplier shall maintain an office and warehouse complete with a wood door inventory within a one hundred (100) mile radius of the jobsite. The Supplier shall further have a qualified field service staff available to service the project.

E. After delivery of wood doors and prior to installation, the Hardware or Door Consultant shall meet with the Contractor to review templates, installation instructions, final hardware schedule, coordination with other trades and preview samples.

F. Failure to meet the above requirements will disqualify the bidder.

G. The Owner may visit the location of the Distributor's office and warehouse to observe if the intent of the requirements set forth in the specifications have been met.

1.5 Submittals

A. Submit complete copies of the wood door shop drawings covering complete details of items required for the project. Complete copies of technical data sheets and other pertinent data are required to indicate compliance with the specification.

1. Shop Drawings: Submit door and frame schedule using reference designations indicated on Drawings. Include opening size(s), handing of doors, details of each frame type, elevations of door design types, location, hardware group numbers, fire label requirements, including fire rating time duration, maximum temperature rise requirements, hardware mounting locations, glass beads/moldings, glass kits, internal blocking, vertical edge details, top and bottom rail details, undercuts, beveling and other pertinent data.

B. As part of the Shop Drawing submittal, provide copy of WDMA J1, Job Site Information, "How to store, handle, finish, install and maintain wood doors."

C. Data submitted shall be job specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents.

D. Provide door construction details/drawings of vertical edges, top rail and SWE details for all doors.

E. Indicate location of cutouts for hardware and blocking to ensure doors are properly prepared and coordinated to receive hardware.

F. Shop drawings, product data, and samples: Contractor to stamp Shop Drawings verifying they have been coordinated and reviewed for completeness and compliance with the contract documents.

G. Shop drawings submitted without the above documentation will be considered incomplete, will not be reviewed, and returned directly to the Contractor.

H. Follow the same procedures for re-submittal as the initial submittal with the appropriate revised dates noted in the shop drawings.

1.6 Quality Assurance

A. Comply with the requirements of the referenced standards. Submit test reports upon request by the Owner or Architect.

B. Underwriters' Laboratories or Intertek Testing Services / Warnock Hersey, Positive Pressure - Category A labeled fire wood doors:

1. Label fire doors listed in accordance with Underwriters Laboratories standard UL10C, Positive Pressure Fire Tests of Door Assemblies and Air Leakage Tests of Door Assemblies - UL 1784.
2. Construct and install doors in accordance with the standards of NFPA 80.

3. Manufacture fire rated doors under the UL or ITS/WH factory inspection program providing the degree of fire protection capability indicated by the door schedule drawings.
4. Provide metal labels permanently fastened on each fire door at an authorized and licensed facility as evidence of compliance with procedures of the labeling agency.
5. No field modifications shall be made to the fire door assembly that would void the label. Field modifications to a fire door shall be in accordance with NFPA80. Work shall be done by a licensed labeling service approved by the manufacturer.
6. Labels are not to be removed, defaced or made illegible while the door is in service per NFPA 80. Fire labels are not to be painted or pre-finished.
7. Fire doors with continuous hinges shall have the physical label located on the top rail of the door.
8. Conform to applicable codes for fire ratings. It is the intent of this specification that wood doors comply or exceed the standards for labeled openings. In case of conflict between door types required for fire protection, furnish the type required by NFPA and UL.
9. Validate the Smoke and Draft Control (“S”) Label for hardware sets that include Category H smoke and draft control seals.
10. All Category G seals required will be concealed in the door or applied to the top rail. No Category G seals will be allowed on the door frame.

C. Door Supplier shall provide one (1) extra door with 6” top rail and exit device blocking. The Contractor, Door Supplier and the Owner to observe and inspect destructive sampling for proper internal construction.

1.7 Warranty

A. Provide Manufacturer's standard warranty form, signed by manufacturer, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship for the life of the original installation of the door.

1.8 Samples

A. Sample Submittal

1. Color samples for factory pre-finishing shall consist of four (4) sets of three (3) finish samples per set. Samples to be minimum 5" x 8" size on specified veneer species. The sample should reasonably represent the color range of the veneer species expected in the finished work.

B. Fire Rated Wood Doors

1. Provide three (3) 10" x 10" cut away corner samples demonstrating door construction with provisions for vertical stiles and top rails as specified.

C. Non-Fire Rated Wood Doors

1. Provide three (3) construction samples demonstrating door construction with provisions for vertical stiles and top rails as specified herein.

1.9 Delivery, Storage, And Handling

A. Provide protective measures throughout the construction period to safeguard doors from damage or deterioration from the time of acceptance.

B. Store and protect doors in accordance with manufacturer's recommendations and Section J-1 of WDMA I.S. 1A-13 - “How to Store, Handle, Finish, Install and Maintain Wood Doors”

1. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse and allow for air circulation.
2. Protect all doors from exposure to direct sunlight and artificial light after delivery.
3. Do not subject interior doors to extremes of either heat or humidity. HVAC systems must be operational and balanced, providing a temperature range of 50 to 80 degrees Fahrenheit and 30% to 60% relative humidity.
4. When handling doors, lift and carry when moving. Do not drag across other doors or surfaces. Handle with clean, dry hands or while wearing clean dry gloves.
5. Manufacturer shall mark each door on the top rail and top hinge pocket with the door opening number. In addition, mark the top rail with manufacture’s name, factory order number, and other additional markings to properly identify the door.

1.10 Coordination

A. Coordinate work with other sections involving manufacture or fabrication of internal cutouts and internal blocking for door hardware, electrified and mortised items. Provide necessary blocking in mineral core doors to prevent door failure from surface applied hardware.

B. The Contractor shall field verify existing door opening conditions, where existing doors or frames are to remain or be replaced in part, for coordination with the specified hardware and notify the Architect of conflicts prior to proceeding. Failure to notify the Architect of conflicts that result in additional work or material is the responsibility of the Contractor, with no cost to the Owner.

C. The supplier shall be responsible for proper coordination, templating, dimensions and all details required for doors, frames and hardware application.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Acceptable manufacturers for wood doors specified are listed below. Only the products of the listed manufacturers will be accepted. No alternates will be accepted. The manufacturers listed are acceptable providing they adhere to the quality standards as noted herein.

1. Eggers Industries
2. Marshfield-Algoma
3. V.T. Industries

B. **The manufacturers listed herein are capable of providing products that meet or exceed the specified requirements. Products that do not comply with the specified requirements and construction will be rejected.**

C. If doors are rejected, replacement doors shall be furnished expeditiously, at no cost to the Owner.

2.2 Doors

A. Quality Assurance Requirements: Flush Wood Doors: Comply with the ANSI/WDMA I.S. 1A–13 Industry Standard for Architectural Wood Flush Doors.

B. Non-Fire Rated Wood Doors - All solid core flush wood doors shall meet WDMA Door Grade and WDMA Performance Duty Level specified.

1. Grade-Custom Grade Construction and Face Grade.
2. WDMA Performance Duty Level-Extra Heavy Duty. All doors shall meet specified WDMA Performance Duty Level, including face screw holding requirement. Surface applied hardware shall be installed in accordance with Section 08710.
3. Door Type - PC-5 - Bonded Wood Based Particle Core, Stiles and rails securely bonded to the core and entire unit abrasively planed prior to application of faces to assure uniform thickness of all components.

C. Fire Rated Wood Doors: Where fire-resistance classifications are shown or scheduled, provide doors that comply with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Label Certification: Doors requiring fire-rating shall carry either UL or ITS (Warnock Hersey) label.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 degrees F (121 degrees C)] above ambient after 30 minutes of standard fire-test exposure.
3. Construction: Category A - intumescent included in door construction where required.
4. Cores: Provide wood fiber or mineral fire-resistant composite core required to provide fire-protection rating indicated.
5. Blocking: Provide composite blocking approved in doors of fire-protection ratings as indicated.

D. Electrical Requirements:

1. General: Make provisions for installation of electrical items specified in Section 08710.

    a. Provide all cutouts and blocking required for wood doors to accept electrical door hardware and security system components.

E. Acoustical Doors:

1. Acoustical Doors shall conform to the American National Standard Acoustical Performance Criteria, Design Requirements and Guidelines for Schools, ANSI/ASA S12.60.

a. These spaces include, but are not limited to, classrooms, instructional pods or activity areas, group instruction rooms, conference rooms, libraries, offices, speech clinics, offices used for educational purposes and music rooms for instruction, practice and performance.

2. Doors into classrooms and other core learning spaces shall conform to the requirements of ANSI/ASA S12.60 with a minimum of a STC 30 operable rating. Doors to music rooms and doors between two classrooms shall be a minimum STC 40 operable rating. Comply with additional requirements as noted in the door schedule.
3. Provide vision lite system consisting of acoustic glass, lite kit and glazing tape of the proper size and thickness to meet or exceed the STC acoustical rating of the door and frame assembly. Provide Anemostat LoPro-STC vision lite system. The vision lite system is to be factory installed on doors with a STC rating of 40 or greater.
4. Door manufacturer shall provide a Letter of Certification from an independent testing laboratory accredited as an acoustical laboratory verifying that conformance to the acoustical performance has been met. Testing shall be performed at laboratories that are fully accredited.
5. Coordinate door preparation for adjustable mortise door bottom as specified under Section 08710 Mortise prep to end 1/4" before edge of door at lock edge, Solid Wood Edge (SWE) prep configuration from DHSI. Bottom rail shall be hardwood or structural composite lumber. Doors are to be factory prepped to receive the door bottom.
6. Doors shall have a 3/8” undercut.
7. Sound seals and gasketing are not to be painted.

F. Veneer and Veneer Matching

1. Veneer Species and Cut: Architect to specify veneer and cut.

   a. Veneer Face Grade WDMA: Grade “A” as described in WDMA I.S. 1A and HPVA Door Veneer tables ANSI/HPVA-1.

2. Matching Between Leaves: Book Match
3. Veneer match: Assembly of Spliced Veneer: Running Match
4. Pair match all pairs and set of pairs separated only by mullions.
5. Set match all groups of pairs and/or individual doors indicated on the door schedule or plans.
6. Veneer Cut: Plain Sliced.
7. Veneer Species: Select White Birch.

G. Non- Fire Rated Door

1. Provide wood based particleboard core. Core to be securely bonded to the stiles and rails with Type I Adhesive.
2. Crossbands

   a. Shall be a minimum thickness of 1/16".
   b. Extend the full width of the door and have no seams.
   c. Composite crossbands of either MDF or particleboard are only permitted provided they meet or exceed the following minimum requirements:

1) Minimum properties for composite crossband must meet physical and mechanical properties of thin MDF - Grade 230 as described in ANSI 208.2
2) Internal bond minimum strength of 150 psi.
3) Linear expansion minimum of < 0.3 % measured between 50% and 80% relative humidity.

3. Vertical Edges

a. Vertical Edges to be same species as face veneer, constructed of two ply laminate hardwood outer layer (outer stile) and hardwood lumber or SCL inner layer (inner stile). Outer ply to be minimum thickness of 1/2” after trim, same species lumber as face. Veneer or lumber less than 1/2” is not acceptable. The net stile width to be minimum 1" after trimming. Veneer edge banding is not acceptable.
b. Provide detail/cross section drawing of door edge construction.

4. Horizontal Edges

a. Rails must be present on all doors.
b. Rails are solid hardwood lumber, with grain running perpendicular to stiles. SCL is allowed for rails. Minimum rail after trim to be 7/8". MDF is unacceptable.

5. Side Panels

a. Fabricate matching panels with same construction as the door. Side panels will be pair matched to the associated door and receive the same finish.

H. Fire-Rated Doors: Provide Positive Pressure Label Doors.

1. Positive Pressure labeled doors to be Category A

a. Validate the Smoke and Draft Control (“S”) Label for hardware sets that include Category H smoke and draft control seals.

2. Core material shall be dictated by manufacturer's fire door approvals.

a. Provide 20 and 45-minute fire doors with wood based particleboard core construction where allowed by manufacturers procedure. Mineral core construction is acceptable when requirements exceed particleboard core label procedures.

3. Stiles (Vertical Edges) - Provide manufacturer's standard solid or laminated edge construction approved for each fire protection level with improved screw holding capability of 550 lbs. in accordance with WDMA TM-10, Extra Heavy Duty.

a. Outer stile to be minimum thickness of ¼” after trim, same species lumber as the face. Veneer or lumber less than ¼” is not acceptable. Veneer edge banding is not acceptable. Provide detail/cross section drawing of door edge construction.

4. Rails (Horizontal Edges) - Rails are solid lumber or other material contained in manufacturer's fire door approvals.

5. Blocking for fire doors must meet WDMA-EMD face screw pull values for surface hardware.

   a. All fire doors shall have a 6-inch minimum top rail after trim. 45-minute wood fire doors are not required to have a 6” combined blocking top rail provided assembly meets heavy duty level.

6. Pairs: Provide fire rated pairs with manufacturers approved stiles which match face veneer constructed as Category A. Veneered edges allowed where required to match face veneer. Exposed intumescent at door meeting edges or applied to frames is not acceptable.

2.3 Door Fabrication

A. Factory pre-fit and pre-machine doors to receive hardware as specified under Section 08710.

1. All doors shall be machined in accordance with manufacturer’s procedures in order to maintain manufacturer’s warranty and to avoid any machining conflicts.
2. Doors are to be beveled at both hinge and lock edges.
3. Factory pre-drill all hinge screw pilot holes for full mortise hinges.
4. Doors shall have a 3/8” undercut.
5. Coordinate door undercuts per architect’s details and hardware specified under Section 08710.
6. All fire doors shall be in accordance with NFPA 80 for clearances and undercutting requirements.

B. Factory preparation for light openings:

1. Factory preparation for new wood doors glazing materials in vision panels shall be installed in labeled glass light kits or in accordance with the fire door listing and shall be installed in accordance with inspection service procedure and under label service per NFPA 80, 4.4.3.1.
2. Glass in new wood doors must be installed by the door manufacturer or in a licensed door shop.
3. Fire protection glazing and fire resistance glazing shall meet all applicable impact safety standards.
4. Provide metal vision kits at all fire labeled doors. Vision kits shall be Anemostat LoPro, 20 gage, with tamperproof screws and beige baked enamel finish. Install tamperproof screw heads on secure side of door. Vision kits shall have UL or W/H classification markings visible for inspection.
5. Wood beads for light opening in non-fire rated wood doors:

   a. Provide manufacturer's standard solid wood straight beads flush design, matching veneer species of door faces. Include finish nails for removable stops in accordance with manufacturers recommendations.

2.4 Factory Finishing

A. All doors, including light beads and moldings, to be factory finished where indicated in schedules or on drawings as factory finished.

B. Finish Requirements.

C. Manufacturer's standard UV Cured Acrylated Polyester/Urethanes, equal to WDMA TR-8.

1. Grade-Premium

2. Coating-Clear

3. Satin Gloss (Gloss range 30-40)

D. Package factory finished doors with manufacturers standard packaging to protect doors from damage during shipment.

PART 3 - EXECUTION

3.1 Installation

A. Install all wood doors in accordance with door manufacturer's instructions and all tolerances outlined in ANSI/WDMA I.S. 1A-13.

B. Install label doors in accordance with NFPA-80. Labels are not to be removed, defaced or made illegible while the door is in service.

C. Inspect doors prior to installation for any damage, manufacturing defects or pre-finish inconsistency.

D. Remove and replace doors that are damaged, warped, twisted or unacceptable to the Architect or Owner.

E. Should there be any door issues do not proceed with installation. Contact door supplier to correct unsatisfactory conditions and proceed with installation only after corrections have been made.

3.2 Adjusting

A. Final Adjustments: Adjust doors and hardware prior to final inspection and acceptance by the Architect and Owner. Replace defective items, including doors that are damaged or unacceptable to the Architect or Owner.

B. Fire Door Assembly Inspection and Testing: Upon completion of the installation, provide functional testing and inspection of each fire door assembly on the project to confirm proper operation and that it meets all criteria of a fire door assembly as per NFPA 80, 5.2 - Inspection and Testing 2013 edition. Inspections shall be performed by individuals with knowledge and understanding of the operating components of the door being subjected to testing and who are certified by Intertek as a Fire Door Assembly Inspector (FDAI) or a credentialed Architectural Hardware Consultant (AHC). A written report using reporting forms provided by the Door and Hardware Institute shall be maintained and transmitted to the Owner, Contractor, Architect and made available to the Authority Having Jurisdiction (AHJ). The report shall list each fire door throughout the project, and include each door number, location, hardware set used and summary of deficiencies.

1. Schedule fire door assembly inspection within 90 days of Substantial Completion of the Project. Coordinate inspection with the Contractor and Owner.

2. Contractor shall correct all deficiencies and schedule a re-inspection of fire door assemblies which were noted as deficient on the inspection report. All deficiencies must be repaired without delay.
3. Inspector shall re-inspect fire door assemblies after repairs are made.
4. Additional re-inspections which are required due to incomplete repairs will be performed by the inspector at the expense of the Contractor.

3.3 Protection

A. Provide protective measures required throughout the construction period to ensure that doors will be without damage or deterioration at time of acceptance.

END OF SECTION

1.0 - GENERAL

1.1 Section Includes

A. Overhead Coiling Counter Doors, manually operated.

B. Overhead Coiling Counter Doors, power operated.

1.2 Related Sections

A. Section 05500 - Metal Fabrications: Support framing and framed opening.

B. Section 06210 - Finish Carpentry: Wood jamb and head trim.

C. Section 08333 - Security Grilles.

D. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.

E. Section 09900 - Painting: Field applied finish.

F. Division 16 -

1. Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.

2. Wiring Connections: Power to disconnect.

1.3 References

A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

E. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

G. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

H. NEMA MG 1 - Motors and Generators.

1.4 Submittals

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation methods.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 Quality Assurance

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Install in areas designated by Architect.
   2. Do not proceed with remaining work until workmanship and installation is approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6 Delivery, Storage, And Handling

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 Project Conditions

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 Coordination

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.9 Warranty

A. Warranty: Manufacturer's limited door warranty for 2 years for all parts and components.

B. Manufacturer's 2 year limited warranty for PowderGuard Premium Powder Coat Finish.

C. Manufacturer's 4 year limited warranty for PowderGuard Zinc Powder Coat Finish.

D. Manufacturer's 5 year limited warranty for PowderGuard Weathered Powder Coat Finish applied to complete door system.

2.0 - PRODUCTS

2.1 Manufacturers

A. Basis of Design is: Overhead Door Corporation., Similar counter doors manufactured by Kinnear/Cookson/Cornell are also pre-approved.

B. Requests for other substitutions will be considered in accordance with provisions of Section 01360.

2.2 Overhead Coiling Steel Counter Doors

A. Galvanized Steel Counter Doors: Overhead Door Corporation, 650 Series.
1. Wall Mounting Condition:Between Jambs Mounting

B. Curtain: Interlocking slats, Type F-158 fabricated of 22 gauge galvanized steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.

C. Finish:
Slats and hood galvanized steel in accordance with ASTM A 653 with rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester (powder coated) top coat.

1. Powder coat: PowderGuard (197 Colors) PowderGuard Premium: Weather resistant polyester powder coat color as selected by the Architect.

2. Non-galvanized exposed ferrous surfaces for guides, bottom bar and head plates shall receive one coat of rust-inhibitive primer.

D. Bottom Bar:
1. Single primed steel angle bottom bar with weatherstrip.

E. Guides: Extruded aluminum.
Finish: PowderGuard Weathered finish with iron/black powder.

F. Brackets: Steel plate to support counterbalance, curtain and hood.
Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.

G. Hood: Provided with intermediate support brackets as required and fabricated of:
1. Galvanized primed steel.

H. Operation:
1. Manual push up

I.

PART 2 EXECUTION

2.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

2.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

G. Install perimeter trim and closures.

2.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

2.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

2.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

A. Fixed tornado shelter windows.

1.2 References

A. AAMA/WDMA/CSA 101/I.S.2/A440 - Voluntary Specification for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

B. AAMA 701/702; 2000 - Combined Voluntary Specifications for Pile Weather strip and Replaceable Fenestration Weather Seals.

C. AAMA 902; 1999 - Voluntary Specification for Sash Balances.

D. AAMA 907 - Voluntary Specification for Corrosion Resistant Coatings on Carbon Steel Components.

E. AAMA 910 - Voluntary "Life Cycle" Specifications and Test Methods for Architectural Grade Windows and Sliding Glass Doors.

F. AAMA 1503.1 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

G. AAMA 512-11 – Voluntary Specifications for Tornado Hazard Mitigation Fenestration Products.

H. FEMA 361 - Design and Construction Guidelines For Community Safe Rooms

I. ANSI Z97.1 - American National Standard For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test/Consumer Products Safety Commission CPSC 16 CFR 1201.

J. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.

K. ASTM E 330; 1997 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

L. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

M. ASTM E 547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference

N. ASTM F 588; 1997 - Standard Test Methods for Measuring the

Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.

O. ASTM F1233 - Standard Test Method for Security Glazing Materials and Systems.

P. ASTM F1642 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings.

Q. GSA TS 01-2003 - US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

R. LEED: The Leadership in Energy & Environmental Design; U.S. Green Building Council (USGBC).

S. 2014 ICC 500

1.3 Submittals

A. Submit under provisions of Section 01350.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings:
1. Elevation for each style window specified indicating its size, glazing type, muntin type and design.
2. Manufacturer's head, jamb and sill details and section views for each window type specified.

D. Schedules:
1. Provide a window schedule indicating the type, size, color, and operation of each unit specified. Coordinate with window mark types found in the Contract Drawings.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns. Samples may be subsequently installed on the project.

G. Test Reports: Submit certified independent testing agency reports indicating window units meet or exceed specified performance requirements.

1.4 System Description

A. Test Units:
1. Air, water and structural test unit shall conform to requirements set forth in AAMA/WDMA/CSA 101/I.S.2/A440.

B. Test Procedures and Performance:
1. Windows shall conform to AAMA/WDMA/CSA 101/I.S.2/A440 requirements for each window type.
2. Air Infiltration Test:
   a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 283 at static air pressure of 6.24 psf.
   b. Air infiltration shall not exceed that specified for each Product.
3. Water Resistance Test:
   a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 331 and ASTM E 547 at static air pressure difference of 12 psf.
   b. There shall be no uncontrolled water leakage.
4. Uniform Load Deflection Test:
   a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 330 at static air pressure (positive and negative) difference of100% design pressure.
   b. During testing, no member shall deflect more than 1/175 of its span.
5. Uniform Load Structural Test:
   a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 330 at static air pressure (positive and negative) difference 150% of design pressure.
   b. At conclusion of test, there shall be no glass breakage; no permanent damage to fasteners, hardware parts, support arms, or actuating mechanisms; no other damage which would cause window to be inoperable.
6. Condensation Resistance Test (CRF):
   a. With window sash closed and locked, test unit in accordance with AAMA 1503.1.
   b. Condensation Resistance Factor (CRF) shall not be less than that specified for each Product.
7. Thermal Transmittance Test (Conductive U-Value):
   a. With window sash closed and locked, test unit in accordance with AAMA 1503.1.
   b. Conductive thermal transmittance (U-Value) shall not exceed that specified for each Product.
8. Life Cycle Test:
   a. Test window in accordance with AAMA 910.
   b. At conclusion of test, there shall be no damage to fasteners, hardware parts, support arms, or actuating mechanisms; no other damage which would cause window to be inoperable. Subsequent air infiltration and water resistance tests shall not exceed specified requirements.
9. Forced Entry Resistance Test: ASTM F 588, Type and Grade as indicated for each Product.
10. Tornado Hazard Mitigating:
    a. Test window in accordance with FEMA 361

b. Furnish windows capable of providing protection from winds as specified in 2014 ICC-500 Tornado Hazard Map.
c. Furnish window that will resist 3-second 180 mph design wind speed and tornado missile speed of 100 mph (15-lb 2X4)
d. A “Pass” test as identified in ICC-500 Chapter 8. Missile did not perforate the glazing; The glazing remained attached to the glazing frame; Glass fragments or shards remained within the glazing unit.
e. Anchors, clips, stops and other accessories shall be provided to comply with AAMA 101.1.S.2 and AAMA 907. Provide units and anchorage mechanism with sufficient strength to withstand required design pressure and strength for specified load conditions.

1.5 Quality Assurance

A. Manufacturer Qualifications: All windows and window hardware specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing windows of the same type and scope as specified.

C. Provide test reports from AAMA accredited laboratory certifying that window units are found to be in compliance with AAMA/WDMA/CSA 101/I.S.2/A440-97 and performance standards listed above.
1. Test reports shall be accompanied by the window manufacturer's letter of certification stating that the tested window meets or exceeds criteria for the appropriate AAMA/WDMA/CSA 101/I.S.2/A440 test.

D. Code Compliance: Provide windows that comply with regulations of the code bodies having jurisdiction including but not limited to 2017 IBC and 2014 ICC 500.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Testing for Air and Water as specified
4. Refinish mock-up area as required to produce acceptable work.

1.6 Delivery, Storage, And Handling

A. Store products in manufacturer's unopened packaging until ready for installation in accordance with manufacturer's recommendations.

B. Protect units against damage from the elements, construction activities and other hazards before, during, and after installation.

1.7 Project Conditions

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions

outside manufacturer's absolute limits.

1.8 Warranty

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

2.0 PRODUCTS

2.1 Manufacturers

A. Acceptable Manufacturer: Winco Window Co.(Basis of Design)

B. Requests for substitutions will be considered in accordance with provisions of Section 01360 and supply a complete window sample test data and other information deemed necessary by the owner and Architect.

2.2 Materials

A. Aluminum:
1. Frame: Extruded aluminum, 6063-T6 alloy and temper, tensile strength of 25,000 psi.
2. Ventilator: Extruded tubular aluminum, 6063-T6 alloy and temper, tensile strength of 25,000 psi.

B. Thermal Barrier:
1. Poured-in-place structural thermal barrier shall transfer shear during bending and provide composite action between frame components.
2. Thermal barrier pocket on aluminum extrusions shall be Azo-Braded to create a mechanical lock to improve the adhesion properties between the polyurethane polymer and the surface of the thermal barrier pocket.
3. Window manufacturer must provide a warranty from the manufacturer of the polyurethane thermal barrier that warrants against product failure as a result of thermal shrinkage beyond 1/8 inch (3.2 mm) from each end and fracturing of the polyurethane for a period not to exceed ten years from the date of window manufacture.

2.3 Thermal Flush Vent Fixed Windows

A. Acceptable Product: (Basis of Design)
1. Winco 3350 Series: 3-1/2 inch Heavy Commercial Thermally Improved Window.

B. Performance: AAMA/WDMA/CSA 101/I.S.2/A440.
1. Architectural Window: AW-80.
2. Water Resistance, ÅSTM E 331: 12 psf (575 Pa).
3. Water Resistance, ÅSTM E 547: 12 psf (575 Pa) for AW rated windows.
4. Air Infiltration, ASTM E 283 at static air pressure of 6.24 psf: 0.05 cfm/sf.
5. Uniform Load Structural Test, ASTM E 330: 120 psf (5748 Pa).
6. Forced Entry Resistance, ASTM F 588: Grade 10.
7. Condensation Resistance Factor (CRF), AAMA 1503.1:

a. Frame: 63.
b. Glass: 66.

8. Thermal Performance ("U" Value), AAMA 1503.1: 0.39 BTU/Hr-F°-Ft2.
9. Blast Resistant: Provide a complete blast resistant window assembly meeting UFC 4-010-01. Reference the Project Blast Load Table for specific Charge Weights and Standoff distances per elevation.

C. Ventilator and Access Sash:
1. Vent Frame: Thermally broken.
2. Vent and access panel shall be flush with exterior frame when closed. Overlap sash is unacceptable.
3. Wall Thickness: 0.125 inches (3.2 mm).
4. Ventilator Depth: 3-5/16 inches (84 mm).
5. Corners: Mitered and mechanically fastened with screws and sealed.

2.4 Hardware

A. Hinged Sash Supports: Stainless steel four bar arms.

2.5 Finish

A. Paint Finish: Finish all exposed areas of aluminum windows and components with the following:
1. 70 percent Kynar in accordance with AA-M12-C42-R1X, AAMA 2605-98
2. Color: To be selected by the Architect from the manufacturer's standard colors.

2.6 Glazing

A. Window Units shall be factory glazed.

B. Refer to Section 08810 - Glass & Glazing

C. Glazing Bead, for Tornado Resistant Windows:
1. Window Series: Winco 3350 Series 3-1/2 inch Heavy Commercial.
a. Glazing Bead: 1-11/16 inch (43 mm) with screwed-in glazing bead.

2.7 Label

All windows shall be factory labeled as required by and to reflect 2014 ICC 500.

3.0 EXECUTION

3.1 Examination

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 Preparation

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 Installation

A. Install in accordance with manufacturer's instructions.

3.4 Protection

A. Protect installed products until completion of project.

B. Final operating adjustment shall be made after glazing work is complete. Operating sash and ventilator shall operate smoothly and shall be weathertight when in locked position

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1.0 - 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: Kawneer Aluminum Entrances and Storefronts, glass and glazing, hardware and components.

1. Type of Aluminum Entrance:
   500 Swing Door; Wide stile, 5" (127 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high traffic applications.

2. Type of Storefront:
   Thermal Barrier (Trifab® VG 451T):
   Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation

B. Related Sections:
1. Section 07910 “Joint Sealants” for joint sealants installed as part of the aluminum storefront system.
2. Section 08710 - Finish Hardware
3. Section 08810 - Glass and Glazing

1.3 Definitions

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 Performance Requirements

A. General Performance: Aluminum-framed entrance and storefront system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

   a. Basic Wind Speed (MPH): (120)
   b. Importance Factor (I, II, III): (1.15)
   c. Exposure Category B

B. Entrance System Performance Requirements:

1. Wind loads: Provide entrance system; include anchorage, capable of withstanding wind load design pressures based on the 2021 International Building Code.
2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 (0.3 l/s · m2) at a static air pressure differential of 6.24 psf (300 Pa).

3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.

4. Uniform Load: A static air design load of 20 psf (958 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: .60 with SHGC not to exceed .25.

6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
   a. Glass to Exterior – 70 frame and 69 glass (low-e)
   b. Glass to Center – 62 frame and 68 glass (low-e)
   c. Glass to Interior – 56 frame and 67 glass (low-e)

7. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
   a. Glass to Exterior – 38 (STC) and 31 (OITC)
   b. Glass to Center – 37 (STC) and 30 (OITC)
   c. Glass to Interior – 38 (STC) and 30 (OITC)

1.5 Submittals

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frame storefront system indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum framed entrance system and components required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12” (300 mm) lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

G. Other Action Submittals:

1. Entrance Door Hardware Schedule: See Section 08710. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 Quality Assurance

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.

F. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.

G. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 Project Conditions

A. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 Warranty

A. Manufactures Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

2.0 - PRODUCTS

2.1 Manufacturers

A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. Trifab® 451T (thermal) Storefront System
   3. 2" x 4-1/2" (50.8 mm x 114.3 mm) System Dimensions
   4. Glass: Center, Exterior or Interior

B. Subject to compliance with requirements, provide a comparable product by the following:
   1. Manufacturer: YKK to meet or exceed the criteria specified.

C. Substitutions: Refer to Substitutions Section 01360 for procedures and submission requirements
   1. For pre-approval: Submit written requests ten (10) days prior to bid date.
   2. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years.

D. Substitution Acceptance: Acceptance will be in written form as an addendum or post bid documented by a formal change order signed by the Owner and Contractor and approved by Architect. No exceptions. No other substitutions will be considered post bid.

2.2 Materials

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
   1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 Storefront Framing System

A. Thermal Barrier (Trifab® VG 451T):
   1. Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 Glazing Systems

A. Glazing: As specified in Division 08810 Section "Glass and Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
   a. Color: To be selected by Architect.

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
   a. Color: Matching structural sealant as selected by Architect.

2.5 Entrance Door Systems

A. Entrance Door Hardware: As specified in Division 08710 Section "Finish Hardware."

2.6 Accessory Materials

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

2.7 Fabrication

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   6. Provisions for field replacement of glazing.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

D. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 Aluminum Finishes

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color to be selected by Architect.

3.0 - EXECUTION

3.1 Examination

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.

B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 Field Quality Control

A. Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 Adjusting, Cleaning, And Protection

A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work under this section consists of all Aluminum Sliding Glass Display Door work.

1.2 Type and Quality
For purposes of designating type and quality for work of this section, Drawings and Specifications are based on products of Kawneer Company, Inc. Whenever substitute products are to be considered, supporting technical literature, samples and drawings must be submitted for approval.

1.3 Work Required
Shall be Series 990 Sliding Door System as furnished by Kawneer Company. This contractor shall furnish all necessary material, labor and equipment for the complete installation.

1.4 Work Not Included
The General Contractor shall provide adequate footings to prevent vertical movement of the base track. Ceiling shall be substantial to prevent deflection beyond adjustment limits of this product, and shall provide adequate anchorage surface for all portions of the head track. Rough openings prepared by the General Contractor shall be per approved shop drawings, and within specified tolerances.

1.5 Submittals
Shop drawings and finishes for approval.

2.0 - PRODUCTS

2.1 Materials
A. Units shall be constructed of aluminum extruded from 6063-T5 alloy.

B. Sliding panels shall roll on 22 gauge, roll-formed stainless steel tracks.

C. All fastenings and fastening devices shall be of aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with aluminum.

2.2 Construction
A. Entire vertical weight of the unit shall be carried by the base tracks.

B. Sliding panels shall be equipped with two center pivoted, spring loaded, tandem wheel assemblies, each having a minimum adjustment of 1/2". Each assembly shall be capable of supporting a minimum moving weight of 200 pounds and shall be equipped with two self-contained, steel ball bearing rollers. Sliding panels shall not be removable when in a locked position.

C. Dimensional control of all members shall be maintained to provide proper fit of all frame and panel components.

2.3 Glazing
Fixed and sliding panels shall be factory glazed with 1/4" tempered glass and continuous vinyl channels with surface striations to prevent separation of glass and panel. The vinyl channels to accommodate specified thickness glazing.

2.4 Hardware

Hardware shall be of the "Flush Face Pull" type. Adams Rite 1850-A-505 M.S. Hook Bolt Cylinder Lock or equal. Key to Master System.

3.0 - EXECUTION

3.1 Installation

Doors shall be securely anchored to a straight, plumb and level condition without distortion of frame or panel components and in strict accordance with the manufacturer's installation details and instruction.

3.2 Finish

Finish shall be selected by the Architect from Manufacturer's Standard Finishes.

3.3 Protection

This contractor shall protect all portions of this product from damage during installation.

3.4 Cleaning and Adjusting

The General Contractor shall be responsible for removal of protective materials and cleaning of the aluminum. All aluminum shall be thoroughly cleaned with plain water, or water with soap or household detergent. Provide final adjustments for easy, smooth operation.

END OF SECTION

1.0 - 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 items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:
1. Hinges
2. Continuous hinges
3. Key control system
4. Lock cylinders and keys
5. Lock and latch sets
6. Closers
7. Protection plates
8. Weatherstripping for exterior doors
9. Thresholds

C. Related Sections: The following Sections contain requirements that relate to the following sections.
1. Section 08110: Hollow Metal Doors and Frames

D. Products furnished but not installed under this Section to include:
1. Cylinders for locks on entrance doors.
2. Final replacement cores and keys to be installed by Owner.

1.3 References

A. Standards of the following as referenced:
1. American National Standards Institute (ANSI)
2. Door and Hardware Institute (DHI)
3. Factory Mutual (FM)
4. National Fire Protection Association (NFPA)
5. Underwriters' Laboratories, Inc. (UL)
   a. UL 10C - Fire Tests Door Assemblies
6. Warnock Hersey

B. Regulatory standards of the following as referenced:
1. Department of Justice, Office of the Attorney General, *Americans with Disabilities Act*, Public Law 101-336 (ADA).
2. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicapped People*, 2010 edition.

1.4 Submittals

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and

finish, and other information necessary to show compliance with requirements. For items other than those scheduled in the “Headings” of Section 3, provide catalog information for the specified items and for those submitted.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format “hardware sets" indicating complete designations of every item required for each door or opening. Use specification heading numbers with any variations suffixed a, b, etc. Include the following information:
      a. Type, style, function, size, and finish of each hardware item.
      b. Name and manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
      e. Explanation of all abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for hardware.
      g. Door and frame sizes and materials.
      h. Keying information.
      i. Cross-reference numbers used within schedule deviating from those specified.
         1) Column 1: State specified item and manufacturer.
         2) Column 2: State prior approved substituted item and its manufacturer.
   2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
   3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Provide samples if requested of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
   1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

F. Contract closeout submittals:
   1. Operation and maintenance data: Complete information for installed door hardware.
   2. Warranty: Completed and executed warranty forms.

1.5 Quality Assurance

A. Single Source Responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.
   1. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware

similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) who is available for consultation to Owner, Architect, and Contractor, at reasonable times during the course of the Work.

B. Coordination Meetings:
   1. Contractor to set up and attend the following:
      a. Lock distributor to meet with the Owner to finalize lock functions and keying requirements and to obtain final instructions in writing.
      b. Lock distributor and lock, closer and exit device manufacturer to meet with the installer prior to beginning of installation of door hardware. Instruct installer on proper installation of specified products.

C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction.
   1. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware to comply with State and local codes and UL 10C.
   2. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

D. All hardware is to comply with Federal and State Handicap laws.

E. Substitutions: Request for substitutions of items of hardware other than those listed as "acceptable and approved" shall be made to the architect in writing no later than fourteen (14) days prior to bid opening. Approval of substitutions will only be given in writing by Addenda. Requests for substitutions shall be accompanied by samples and/or detailed information for each manufacturer of each product showing design, functions, material thickness and any other pertinent information needed to compare your product with that specified. Lack of this information will result in a refusal.

1.6 Product Handling

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 Warranty

A. Special warranties:
1. Door Closers: Thirty year period
2. Locks and Cylinders: Three year period
3. Panic Hardware: Three Year period

1.8 Maintenance

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions that are packed in hardware items for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

2.0 - PRODUCTS

2.1 Manufactured Units

(*Denotes preferred manufacturer)

A. Hinges:
1. Acceptable manufacturers:
a. Ives*
b. Stanley
c. McKinney
2. Characteristics:
a. Templates: Provide only template-produced units.
b. Screws: Provide Phillips flat-head screws complying with the following requirements:
1) For metal doors and frames install machine screws into drilled and tapped holes.
2) For wood doors and frames install threaded-to-the-head wood screws.
3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
4) Finish screw heads to match surface of hinges or pivots.
c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
1) Out-Swing Exterior Doors: Non-removable pins.
2) Out-Swing Corridor Doors with Locks: Non-removable pins.
3) Interior Doors: Non-rising pins.
4) Tips: Flat button and matching plug. Finished to match leafs.
d. Size: Size hinges in accordance with specified manufacturer’s published recommendations.
e. Quantity: Furnish one pair of hinges for all doors up to 5’-0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof, unless otherwise specified in Hardware Headings.

B. Continuous Hinges:
1. Acceptable manufacturers:
a. Ives*
b. Select Products
c. Markar
2. Characteristics:

a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish, or factory painted finish as scheduled.
b. All hinges are to be manufactured to template. Uncut hinges to be non-handed and to be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
c. Vertical door loads to be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves to be continually geared together for the entire hinge length and secured with a full cover channel. Hinge to operate to a full 180°.
d. Hinges to be milled, anodized and assembled in matching pairs. Fasteners supplied to be steel self-drilling, self-tapping 12-24 x ¾" screws.
e. Provide UL listed continuous hinges at fire doors. Continuous hinges at fire doors (suffix -FR) to meet the required ratings without the use of auxiliary fused pins or studs.

C. Cylinders:
1. Acceptable manufacturers:
a. Match existing keying system.
2. Characteristics:
a. Existing System: Grandmaster key the locks to the Owner's existing system, with a new master key for the Project.
b. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated into Owner's existing system.
c. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
d. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".
e. Key Material: Provide keys of nickel silver only.
f. Key Quantity: Furnish (3) change keys for each lock, (5) master keys for each master system, (5) grandmaster keys for each grandmaster system, (10) construction master keys.
1) Furnish one extra blank for each lock.
2) Furnish construction master keys to General Contractor.
3) Deliver keys to Owner.

D. Mortise Locksets and Latchsets: as scheduled.
1. Acceptable manufacturers:
a. Schlage L9000 Series*
b. Sargent 8200
c. Corbin Russwin ML2000 Series
2. Required Features:
a. Chassis: Cold-rolled steel, handing field-changeable without disassembly.
b. Latchbolts: 3/4-inch throw stainless steel anti-friction type.
c. Lever Trim: Through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: Independent break-away.

d. Thumbturns: Accessible design not requiring pinching or twisting motions to operate.
e. Deadbolts: Stainless steel 1-inch throw.
f. Strikes: 16 gage curved stainless steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
g. Field verify and match existing lever design.
h. Certifications:
1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
2) ANSI/ASTM F476-84 Grade 30 UL Listed.

E. Exit Devices:
1. Acceptable manufacturers:
a. Von Duprin 98 Series*
b. Sargent 8000 Series
c. Detex Advantex Series
2. Characteristics:
a. Exit devices to be UL Listed for life safety. Exit devices for fire rated openings to have “UL" labels for “Fire Exit Hardware."
b. Exit devices mounted on labeled wood doors to be mounted on the door per the door manufacturer’s requirements.
c. All trim to be thru-bolted to the lock stile case.
d. Lever trim to be solid case material with a break-away feature to limit damage to the unit from vandalism. Lever design to match locksets.
e. All exit devices to be made of brass, bronze, stainless steel, or aluminum material, powder coated, anodized, or plated to the standard architectural finishes to match the balance of the door hardware.
f. Provide glass bead conversion kits to shim exit devices on doors with raised glass beads.
g. All exit devices to be one manufacturer. No deviation will be considered.
h. All series exit devices to incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. All exit devices to be non-handed. Touchpad to extend a minimum of 1/2 of the door width and to extend to the height of the cross rail housing for a “no pinch” operation. Plastic touchpads are not acceptable. All latchbolts to be the deadlocking type. Latchbolts to have a self-lubricating coating to reduce wear. Plated or plastic coated latchbolts are not acceptable. Plastic linkage and “dogging” components are not acceptable.
i. Surface vertical rod devices to be UL labeled for fire door applications without the use of bottom rod assemblies. Where bottom rods are required for security applications, the devices to be UL labeled for fire doors applications with rod and latch guards by the device manufacturer.
j. Exit devices to include impact resistant, flush mounted end cap design to avoid damage due to carts and other heavy objects passing through an opening. End cap to be of heavy-duty metal alloy construction and provide horizontal adjustment to provide alignment with device cover plate. When exit device end cap is installed, no raised edges will protrude.

F. Closers and Door Control Devices:
1. Acceptable manufacturers:
   a. LCN Closers 4010/4110 Series*
   b. Corbin Russwin DC8000
   c. Norton 9500
2. Characteristics:
   a. Door closers to have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder.
   b. All closers to utilize a stable fluid withstanding temperature range of 120°F to -30°F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors to be provided with temperature stabilizing fluid that complies with standards UBC 7-2 (1997) and UL 10C.
   c. Spring power to be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Spring power adjustment (LCN Fast ™ Power Adjust) allows for quick and accurate power adjustment and visually shows closer power size settings by way of dial adjustment gauge located on closer spring tube. Hydraulic regulation to be by tamper-proof, non-critical valves. Closers to have separate adjustment for latch speed, general speed and back check.
   d. All closers to have solid forged steel main arms (and forearms for parallel arm closers) and where specified to have a cast-in solid stop on the closer shoe (“CUSH”). All parallel arm mounted closers to have “EDA” type arms or, where door travel on out-swing doors must be limited, use “CUSH” or “SCUSH” type closers. Auxiliary stops are not required when “CUSH” type closers are used. Provide drop plates where top rail of door is not sufficient for closer mounting. Provide “cush shoe supports” and “blade stop spacers” where dictated by frame details.
   e. Surface Door Closers shall be cast iron construction, minimum 1 ½” closer piston diameter, manufactured in USA, to be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory and shall have minimum ten year service record in K-12 school environments. Requests for approval for surface door closers shall be accompanied by project references. Approval shall be solely at the architect’s discretion. All closers (overhead, surface and concealed) to be of one manufacturer and carry manufacturer's thirty year warranty
   f. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
   g. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors to provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
   h. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.

F. Floor Stops and Wall Bumpers:
1. Acceptable manufacturers:

a. Ives*
b. Trimco
c. Rockwood Manufacturing

2. Characteristics: Refer to Hardware Headings.

G. Protective Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide manufacturers standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
b. Materials:
1) Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
c. Fabricate protection plates not more than 2 inches less than door width on push side and not more than 1 inch less than door width on pull side.
d. Heights:
1) See headings for plate sizes.

H. Thresholds:
1. Acceptable manufacturers:
a. Zero Weatherstripping Co., Inc.*
b. National Guard Products, Inc.
c. Reese Industries
2. Types: Indicated in Hardware Headings.

I. Door Seals/Gasketing:
1. Acceptable manufacturers:
a. Zero Weatherstripping Co., Inc.*
b. National Guard Products, Inc.
c. Reese Industries
2. Types: Indicated in Hardware Headings.

2.2 Materials And Fabrication

A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
1. Do not provide hardware that has been prepared for self-tapping sheet

metal screws, except as specifically indicated.

2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including “prepared for paint" surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
4. Do not use thru-bolts or sex bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of adequately fastening the hardware, or otherwise found in Headings. Coordinate with wood doors and metal doors and frames. Where thru-bolts are used, provide sleeves for each thru-bolt as a means of reinforcing the work, or use sex screw fasteners.

2.3 Hardware Finishes

A. Match items to the manufacturer’s standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by ANSI or, if none established, match the Architect’s sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer’s standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
1. Continuous Hinges: 628 (US28) Clear Anodized Aluminum
2. Hinges: 652 (US26D) Satin Chrome Plated Steel
3. Mortise Locks: 630 (US32D) Satin Stainless Steel
4. Exit devices: 630 (US32D) Satin Stainless Steel
5. Door Closers: 689 Powder Coat Aluminum
6. Protective Plates: 630 (US32D) Satin Stainless Steel
7. Door Stops: 626 (US26D) Satin Chrome Plated Brass/Bronze

3.0 - EXECUTION

3.1 Installation

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.

3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section “Joint Sealers”.

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
   1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Supplier's Field Service:
   1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
   2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
   3. File written report of this inspection to Architect.

HARDWARE SCHEDULE

HARDWARE SET: A01
EACH TO HAVE:

2	CONT. HINGE	112XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CD-98-DT	VON
1	PANIC HARDWARE	CD-98-NL	VON
4	CYL/CORE	AS REQUIRED	
2	OH STOP	100S	GLY
2	SURFACE CLOSER	4021 MC TBSRT	LCN
2	MOUNTING PLATE	4020-18/18G SRT (AS REQ'D)	LCN
1	MULLION SEAL	139N PSA	ZER
1	THRESHOLD	65A	ZER

COORDINATE HARDWARE WITH ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.
BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

HARDWARE SET: A02
EACH TO HAVE:

2	CONT. HINGE	112XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CD-98-DT	VON
1	PANIC HARDWARE	CD-98-NL	VON
4	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	4021 MC TBSRT	LCN
2	MOUNTING PLATE	4020-18/18G SRT (AS REQ'D)	LCN
2	FLOOR STOP	FS18S	IVE
1	MULLION SEAL	139N PSA	ZER
1	THRESHOLD	65A	ZER

COORDINATE HARDWARE WITH ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.
BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

HARDWARE SET: B01
EACH TO HAVE:

6	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CD-98-DT-SNB	VON
1	PANIC HARDWARE	CD-98-NL-SNB	VON
4	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	MULLION SEAL	139N PSA	ZER
1	RAIN DRIP	142AA (AS REQ'D)	ZER
2	MEETING STILE	328AA-S (PAIR)	ZER
1	GASKETING	8144FSBK PSA	ZER
2	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: B02
EACH TO HAVE:

6	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	LD-98-EO-990-SNB	VON
1	PANIC HARDWARE	LD-98-NL-SNB	VON
2	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	MULLION SEAL	139N PSA	ZER
1	RAIN DRIP	142AA (AS REQ'D)	ZER
2	MEETING STILE	328AA-S (PAIR)	ZER
1	GASKETING	8144FSBK PSA	ZER
2	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: B03
EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	STOREROOM LOCK	L9080	SCH
1	CYL/CORE	AS REQUIRED	
1	OH STOP	100S	GLY
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144FSBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: C01
EACH TO HAVE:

2	CONT. HINGE	224XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CD-98-DT-SNB	VON
1	PANIC HARDWARE	CD-98-NL-SNB	VON
4	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	MULLION SEAL	139N PSA	ZER

HARDWARE SET: D01
EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: D02
EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: D03
EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	CLASSROOM DEAD LOCK	L463	SCH
1	CYL/CORE	AS REQUIRED	
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: D04
EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: E01
EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	OFFICE/ENTRY LOCK	L9050 L583-363	SCH
1	CYL/CORE	AS REQUIRED	
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: E02
EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	OFFICE/ENTRY LOCK	L9050 L583-363	SCH
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: E03
EACH TO HAVE:

6	HINGE	5BB1 4.5 X 4.5	IVE
1	CONST LATCHING BOLT	FB51P	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	CLASSROOM LOCK	L9070	SCH
1	CYL/CORE	AS REQUIRED	
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: E04
EACH TO HAVE:

6	HINGE	5BB1 4.5 X 4.5	IVE
1	CONST LATCHING BOLT	FB51P	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	CLASSROOM LOCK	L9070	SCH
1	CYL/CORE	AS REQUIRED	
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4011 MC TBWMS	LCN
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: E05
EACH TO HAVE:

2	CONT. HINGE	224XY	IVE
1	CONST LATCHING BOLT	FB51P	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	CLASSROOM LOCK	L9070	SCH
1	CYL/CORE	AS REQUIRED	
2	OH STOP	90S	GLY
2	ARMOR PLATE	8400 34" X 2" LDW B-CS	IVE

HARDWARE SET: E06
EACH TO HAVE:

6	HINGE	5BB1 4.5 X 4.5	IVE
1	CONST LATCHING BOLT	FB51P	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	STOREROOM LOCK	L9080	SCH
1	CYL/CORE	AS REQUIRED	
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4011 MC TBWMS	LCN
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: F01
EACH TO HAVE:

1	HINGE	3CB1 4.5 X 4.5	IVE
2	SPRING HINGE	3SP1 4.5 X 4.5	IVE
1	PRIVACY LOCK	ND40S	SCH
1	WALL STOP	WS401/402CCV	IVE

ADJUST SPRING HINGES TO CLOSE STALL DOORS JUST SHORT OF LATCHING THE STALL DOOR. PROVIDE WALL STOP WHERE APPLICABLE.

HARDWARE SET: F02
EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	STOREROOM LOCK	L9080	SCH
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: F03
EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	STOREROOM LOCK	L9080	SCH
1	CYL/CORE	AS REQUIRED	
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: F04
EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	STOREROOM LOCK	L9080	SCH
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	GASKETING	8144FSBK PSA	ZER

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work under this section consists of all glass and glazing.

1.2 Quality

A. Glazing shall be provided to comply with Table 5.3.1 Building Envelope Requirements - Climate Zone 1 of the Alabama Building Energy Conservation Code, and the 2015 International Building Code.

B. Glazing for Fire-Rated Door and Window Assemblies: Glazing tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labeled per requirements of authorities having jurisdiction.

C. Safety Glazing Products: Comply with size, glazing type, location, and testing requirements of 16 CFR 1201 for Category I and II glazing products, and requirements of authorities having jurisdiction.

D. Glazing Industry Publications: Comply with glass product manufacturers' recommendations and the following:

1. GANA Publications: GANA Laminated Division's 'Laminated Glass Design Guide' and GANA's 'Glazing Manual.'
2. IGMA Publication for Insulating Glass: IGMA TM-3000, 'Glazing Guidelines for Sealed Insulating Glass Units.'

E. Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

1.3 Samples

Submit for approval samples of each kind of glass required. Each sample shall bear a label indicating the kind and quality of the glass and the manufacturer.

1.4 Warranty

A. Warranty for Coated-Glass Products: Manufacturer's standard form, signed by coated-glass product primary manufacturer or manufacturer/fabricator, as applicable, agreeing to replace coated-glass units that display peeling, cracking, and other deterioration in metallic coating under normal use, within 10 years of date of Substantial Completion.

B. Warranty for Laminated Glass: Manufacturer's standard form, signed by laminated-glass product manufacturer/fabricator, agreeing to replace laminated-glass units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C 1172, within five years of date of Substantial Completion.

C. Warranty for Insulating Glass: Manufacturer's standard form, signed by insulating-glass product manufacturer/fabricator, agreeing to replace insulating-glass units that exhibit failure of hermetic seal under normal use evidenced by the obstruction of vision by dust, moisture, or film on interior surfaces of glass, within 10 years of date of Substantial Completion.

D. Installer's Warranty: Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing products due to faulty installation, within 2 years of date of Substantial Completion.

2.0 - PRODUCTS

2.1 Manufacturer

Glass products shall be as manufactured by Vitro Architectural Glass., Guardian Industries, Inc., or Pre-approved equal. Laminated pattern glass shall be as manufactured by North American Glass Fabrication. Fire-rated, safety-rated wired glass shall be manufactured by Technical Glass Products.

2.2 Materials

Glass shall be as defined in, and in accordance with Code of Federal Regulations 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

A. Compound for face glazing, or where shown or indicated as compound shall be an oleo-resinous knife grade elastic glazing compound such as Tremco's Trem-glaze, Pecora's M-242, or Dap-1012.

B. Sealant where shown or indicated shall be Tremco "Mono," Dow Cornings 780, or GE's construction sealant.

C. Tape where shown or indicated shall be Tremco's 440 Tape, Curtis 606 Tape, or Warflex's "Sealing Tape."

D. Neoprene setting blocks as approved by glass manufacturer Shore "A" Hardness approximately 70 to 90.

E. Neoprene spacer shims as approved by glass manufacturer Shore "A" Hardness approximately 40 to 60.

F. Neoprene glazing beads as approved for aluminum store front and doors.

G. Color of compound, sealant, tape, etc. shall be as selected.

H. Glare reducing glass shall be 1/4" thick Solargray, Solargreen, or Solarbronze as selected.

I. Glare reducing Tempered Safety glass shall be 1/4" thick Solargray, Solargreen, or Solarbronze as selected. When multiple small glass panes are used in the same door or sidelight, provide one (1) only Decal and furnish certificate verifying the use of Safety Glass in other panels.

J. Interior Tempered Safety Glass shall meet 16CFR1201 Test Requirements, Cat. 1 and/or Cat. 2 as applicable. Etch label and furnish certificate verifying the use of Tempered Safety Glass.

K. Fire safety glass shall be 5/16" thick clear laminated fire rated and impact safety rated glass. Approved equal to Pilkington Fire-Lite Plus and shall meet impact safety rating 16CFR1201 (Cat.1) if less than 9 sq. ft. and (Cat. 2) if greater than 9 sq. ft. Provide with label at all rated doors and frames..

L. 1" insulating Glass - Pre-assembly Low-E unit consisting of 1/4" float glass exterior lite, 1/2" dehydrated air space and clear 1/4" float glass with Low-E interior lite meeting performance requirement for Class A or Class B Accelerated Test as specified in ASTM E744 with no visible fog. Match color on metal spacer to glazing frame. As selected by Architect. Provide minimum SHGC of .25.

1. Solarban70 Solar Gray + Clear
2. Solarban60 Solar Gray + Clear
3. Solarban70 Solar Bronze + Clear

(See corresponding SHGC and U-Value below when used with metal frame)

M. Exterior Glazing shall be **Hurricane Impact Resistant Glazing** and shall be 1" insulated Low-E. Comply with all Local and State Building Codes to meet performance requirements. Glazing shall be equal to Insulgard or Oldcastle Hurricane Impact Resistant Glazing.

3.0 - EXECUTION

3.1 Preparation

A. Immediately prior to glazing, all surfaces shall be wiped clean and free of protective coatings, moisture, and dust. All glazing shall be done when the temperature is 35° F or above.

B. All sash shall be checked prior to glazing to make certain that the opening is square, plumb, and secured in order that uniform face and edge clearances are maintained. Inspect all butt and miter joints. If these joints are open, they shall be sealed with sealant prior to glazing. All ventilators shall be properly adjusted. Maintain 1/8" minimum bed clearance between glass and sash on both sides.

C. All glass indicated in non-rated doors shall be tempered with etched label.

D. All glass indicated in rated doors shall be fire safety glass with etched label.

3.2 Setting

A. Glazing preparation and procedures shall be as outlined in the Glazing Manual of the Flat Glass Jobbers Association.

B. Glass shall be set without springing, and with an equal bearing the entire width and length of each piece.

C. The actual sizes required shall be determined by measuring the frames to receive the glass. All glass shall be factory labeled.

D. Glass shall be properly cut and set in accordance with the best practice of the trade.

E. Center glass in glazing rabbet to maintain recommended clearances at perimeter for expansion and contraction, each face of glass.

3.3 Protection

Immediately after installation, a marker letter shall be placed upon each pane of glass for protection against careless breakage. All broken, cracked, scratched, or otherwise damaged glass shall be replaced.

3.4 Cleaning

A. Upon completion of the project, all glass shall have paint, dirt, and other stains removed; glass shall then be washed clean and polished.

B. Labels on glass shall not be removed until final approval is obtained, and glass is ready for cleaning.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Safety and Security retrofit overglaze laminate system for forced entry,
   1. Doors, windows, aluminum framed storefront and building curtainwall.

1.2 RELATED SECTIONS

A. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts: Glazing system to receive safety and security control film.

B. Section 08 81 00 – Glass Glazing: Glass and glazing materials to receive safety and security control film.

C. REFERENCES

D. ASTM International (ASTM):
   1. .
   2. ASTM C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
   3. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
   4. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
   5. D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
   6. D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion. (Taber Abrader Test)
   7. D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
   8. D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting
   9. D3330 -Standard Test Method for Peel Adhesion of Pressure- Sensitive Tape.
   10. D4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing
   11. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   12. ASTM F1233 - Standard Test Method for Security Glazing Materials and Systems.
   13. ASTM F3561 - Standard Test Method for Forced-Entry-Resistance of Fenestration Systems After Simulated Active Shooter Attack.

E. American National Standards Institute (ANSI):
   1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements Administrative Requirements.

B. Product Data:
   1. Manufacturer's data sheets on each product to be used.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Typical installation methods.

C. Verification Samples: Two representative units of each type, size, pattern, and color.

D. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.

B. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity. Impact Security is the exclusive manufacturer for all products.

C. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
   1. The intent of mock-up is to demonstrate quality of workmanship and visual appearance.
   2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
   3. Retain mock-up during construction as a standard for comparison with completed work.
   4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer's two (1) year standard limited warranty for component parts and labor when installed by manufacturer certified installer.
   1. Overglaze Polycarbonate Shield Warranty: Seven (7) years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis Of Design: 3M Safety S40: Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass.

B. Acceptable Manufacturers:
   1. Solar Guard.
   2. Johnson Window Films

C. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00 - Product Requirements Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Physical / Mechanical Performance Properties:
   1. Film Color: Clear.
   2. Thickness: Nominal 4 mils.
   3. Tensile Strength (ASTM D 882): 25,000 psi.
   4. Break Strength (ASTM D 882) (Per Inch Width): 100 lbs.

B. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.

C. Variation in Total Transmission across the Width: Less than 2% over the average at any portion along the length.

D. Identification: Labeled as to Manufacturer as listed in this Section.

E. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
   1. Visible Light Transmission (ASTM E 903): 85%.

F. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   1. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
   2. Impact Resistance and pressure cycling are performance based tests for Building Envelope Protection. Manufacturer shall provide 3rd party test reports showing the product complies with the impact and pressure cycling requirements of ASTMs E1886 / E1996. Contact 3M for specific test details.

G. Forced Entry Protection: Independent lab testing according to UL 972 protocol (Multiple Impact Test).
   1. Annealed Glass (1/4 inch) - Pass.
   2. Tempered Glass (1/4 inch) - Pass.

2.3 FABRICATI0N

A. Shields and Hardware:
   1. Fabricate security and ballistic shields from pre-determined sheet sizes as manufactured.
   2. Cut and fabricate security panels and mounting frames and hardware to surveyed sizes.
   3. Apply sacrificial protective layers at factory and prior to shipment of completed product to maintain system integrity.

B. Finish work neat and free from defects per ASTM and standards.

C. Tolerances: Plus, or minus 1/16 inch (1.6 mm) for frame opening width, height, diagonal dimensions, and overall width and height, outside to outside.

2.4 MATERIALS

A. Neoprene Glazing Gaskets:
   1. Interior Glazing gaskets closed cell cellular neoprene conforming to ASTM C509 Type II Option 1 with a 40-50 Shore A Durometer.
   2. Exterior Glazing gaskets solid neoprene conforming to ASTM C864 with a 65-75 Shore A Durometer.

B. Weatherstripping: Entrance manufacturer's standard types to suit application.

C. Fasteners: Stainless steel or corrosion resistant steel. Security fasteners only.

D. Glazing Sealants and Adhesives:
   1. Dow 995 or Dow 795 for exterior applications.
   2. Dow 995, Dow 795, or 3M IPA for interior applications.

2.5 ACCESSORY COMPONENTS

A. Finish Trim: Available in a broad range of anodized and painted finishes to make the system virtually invisible.

B. Custom Powder Coat: As specified by owner.

C. Aluminum Frame Standoffs: Designed to keep protected glass from breaking upon physical attack.

D. Entombed Desiccant within Bottom Frame Member: Eliminates moisture to prevent fogging and moisture damage during installation of overglaze.

E. Sacrificial, clear surface protective film on overglazed doors to remain post installation to protect shields.

F. Branded Graphics and Vinyl Film Products: Static cling and surface mounted.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the substrates have been properly constructed and prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Security Film Application
   1. Install window film in accordance with manufacturer instructions.
   2. Thoroughly clean and dry glazing system.
   3. Cut film neatly and square to a slightly larger size than the exposed glass area.
   4. Remove release liner and spray both adhesive and glass surface with mounting solution to permit positioning on glass. Place film with adhesive side on glass, ensuring entire glass surface is covered.
   5. Spray outside surface with solution and squeegee film into place working from the center outward and from the top down, stopping a few inches from the edges.
   6. For a daylight installation trim film to align with edges of exposed glazing, leaving approximately 1/16” to 1/8” gap from the edge of the film to the gasketing of the window system to permit edge lay down. Use sharp blades recommended for this purpose. Replace blade after approximately 4 cuts.

7. Repeat spraying and squeegee procedure, vigorously moving water from center to right and left edges working from top down to bottom.
8. “Bump” edges by applying firm pressure to force water out the edge using a hard card wrapped with a paper towel to ensure anchorage of the film edges.
9. Once installation is complete, clean work area thoroughly.
10. While some water may remain between the film and glass surface for up to 60 days, excessive amounts must be addressed immediately according to manufacturer’s instructions.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

A. Clean products in accordance with the Manufacturer's recommendations.

B. Remove excess joint sealant in accordance with sealant Manufacturer's instructions.

C. Do not use harsh cleaning materials or methods that would damage glazing or finish.

D. Protect installed products until completion of project.

E. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

GYPSUM DRYWALL & LIGHT GAUGE METAL STUD SYSTEM - SECTION 09260

1.0 - GENERAL

1.1 Scope

The work of this section consists of the furnishing and erection of all metal studs and gypsum wall board, finished ready for field decoration.

1.2 Submittals

A. Submit manufacturer data, samples and shop drawings.

1.3 Applicable Standards

Current editions or revisions of Federal and ASTM standards shall apply unless specifically noted otherwise.

1.4 Delivery and Storage

All materials shall be delivered to the job in original unopened containers or bundles and stored in a place protected from the elements and damage.

2.0 - PRODUCTS

2.1 Materials

A. Interior wall metal studs shall be cold rolled "Cee" design 25-gauge steel, prepared to receive self-drill, self-tapping screw fasteners. Metal studs web shall be punched to facilitate work of other crafts. At interior wall with plumbing, provide metal stud framing wide enough to fully conceal plumbing work.

B. Exterior wall metal studs shall be 3-5/8" 20-gauge metal studs and runners, welded system, unless noted otherwise. At all areas to receive masonry veneer, use 18-gauge metal studs and runners.

C. Track shall be of proper dimension to receive metal studs and provide a close friction fit.

D. Metal studs and track shall be hot-dipped galvanized.

E. Wall board shall be a mill fabricated gypsum board consisting of a core of processed gypsum rock encased in a heavy mineral finished paper on the face side and a strong liner paper on the back side. The face paper shall be folded around the long edges to reinforce and protect the core and the ends shall be square cut and smooth finish. Thickness shall be as indicated on the Drawings but not less than 5/8".

F. Fire resistant wall board shall be a board having a specifically formulated core which shall meet Underwriter's Laboratory tests for a one-hour fire resistant rating. Material shall be equal to USG Sheetrock® Brand Ultralight Panels Fire code® X as manufactured by U.S. Gypsum, Fire-Shield® LITE® as manufactured by National Gypsum, Fireguard® by Georgia-Pacific.

G. Moisture- and Mold-resistant, Fire-resistant Gypsum Core shall be 5/8" thick Fire code equal to SHEETROCK® brand MOLD TOUGH™ FIRECODE® .

Provide at all walls subject to moisture and/or at walls behind drinking fountains, sinks, lavatories, urinals, water closets, and all other plumbing fixtures where drywall is indicated.

H. For High Impact Areas as indicated provide USG Sheetrock® Brand Mold Tough® VHI Firecode® X Panels or pre-approved equal that meets testing requirements for High Impact. The main ASTM standard for abuse classification is **ASTM C1629** which specifies the levels of performance. Annex A1 describes test methods for testing products for Hard Body Impact Resistance.

> **ASTM C1629** makes reference to three other test methods for abuse resistance: **ASTM E695** for Soft Body Impact, **ASTM D4977** for Abrasion resistance, **ASTM D 5420** for Indentation Resistance.

I. Runner channels shall be hot-rolled or cold-rolled steel and shall be galvanized or given a coat of rust-inhibitive paint. Runner channels shall be one and one-half inches (1-1/2") with flange approximately one-half inch (1/2") deep, spaced not over forty-eight inches (48") on centers. Hot Rolled Channel shall weigh not less than 850 pounds per 1,000 lineal feet; cold rolled channel shall weigh not less than 475 pounds per 1,000 feet.

J. Fasteners shall be flat, countersunk head drywall screws, USG Type S or as approved, or annular nails for use with nailer bars or for wood.

K. Trim shall be hot dip galvanized steel, corner bead, casing, and expansion strips.

L. Joint tape shall be a heavy perforated cross fibered reinforced paper.

M. Joint cement shall be a bedding and finishing cement especially prepared for use with reinforcing joint tape.

N. Metal accessories shall be provided at all exterior corners, where a horizontal surface abuts a vertical surface or where an exposed edge of the wallboard abuts metal. Material shall be as manufactured by or as recommended by the manufacturer of the wall board used.

O. Control joints shall be provided at all corners, intersections, ceilings, etc., subject to movement. Install control joints in areas as recommended by manufacturer and/or as indicated on drawings.

2.2 Auxiliary Materials

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

3.0 - EXECUTION

3.1 A. Floor and ceiling tracks aligned accurately according to partitions layout and anchored securely into structural floor and overhead structure at maximum of 16" o.c. All walls shall extend to underside of deck above.

B. Studs spaced not greater than 16" o.c. for gypsum board, anchored securely to floor and ceiling tracks. Set studs approximately 2" from abutting partitions or walls at corners, openings and ends of partitions. Anchor door bucks to adjacent studs.

C. Partitions shall be rigid, sound and plumb with all necessary metal trim, clips and accessories for a complete installation.

D. Gypsum board shall be applied in single layer or multiple layers as indicated on the Drawings by screw application to metal studs with joints taped and filled with manufacturer's recommended joint compound.

E. Application of gypsum board and joint finishing shall not begin under cold or damp conditions. The temperature shall be a minimum of 35^0 before work is begun and shall be maintained at this level or above until the joint cement is set dry and hard. Adequate ventilation shall be provided at all times.

F. Installation shall be in full accord with the recommendations of the manufacturer. Workmanship shall be by competent workmen experienced in the installation of wall board and all work shall be done in accordance with the best practices of the trade to give a smooth, straight, aligned surface which is ready for the finish.

G. Apply metal trim at exposed edges.

H. Neatly cut all openings so that they may be covered by plates and escutcheons.

I. Vertical Furring - All vertical furring in ceiling shall be of 5/8" fire rated gypsum board on metal framing. DO NOT furr with acoustical panels.

3.2 Drywall Finish

A. Temperature and Humidity Conditions
Do not install joint treatment compounds unless installation areas comply with the minimum temperature and ventilation requirements recommended by the manufacturer and conditions are acceptable to the installer.

B. Finish exposed drywall surfaces with joints, corners, and exposed edges reinforced or trimmed as specified, and with all joints, fastener heads, trim accessory flanges and surface defects filled with joint compound in accordance with manufacturer's recommendation for a smooth, flush surface. Drywall finishing work will not be considered acceptable if corners or edges do not form true, level or plumb lines, or if joints, fastener heads, flanges of trim accessories or defects are visible after application of field-applied decoration.
1. Refer to ASTM 6840 for guidelines for acceptable levels of finish.
   a. Finish Level shall be no less than Level 3 for all exposed Gypsum Board.

C. Joint and Corner Reinforcing
1. Use joint tape to reinforce joints formed by tapered edges or butt ends of drywall units and at interior corners and angles. Set tape in joint compound then apply skim coat over tape in one application.

2. Where open spaces of more than 1/16" width occur between abutting drywall units (except at control joints), prefill joints with joint compound and allow prefill to dry before application of joint tape.

3. Provide control joints as recommended by manufacturer.

D. Reinforce external corners of drywall work with specified type of corner bead.

Securely fasten metal corner beads as recommended by the manufacturer. Do not use fasteners which cannot be fully concealed by joint compound fill applied over flanges.

E. Edge Trimming
Provide specified type of metal casing bead trim. Install in single unjointed lengths unless run exceeds longest available stock length. Miter corners of semi-finished type trim. Coordinate installation of trim continuously with drywall installation.

F. Application of Joint Compounds

Use only compatible compounds from one manufacturer. After mixing, do not use joint compounds if recommended pot-life time has expired. Allow drying time between applications of joint compound in accordance with manufacturer's recommendations for the relative humidity and temperature levels at the time of application. In no case, allow less than 24 hours drying time between application to joint compound. Apply not less than 3 separate coats of joint compound over joints, fastener heads, and metal flanges. Joint compound treatment is not required at non-fire rated walls above suspended ceiling where partitions/walls are shown or specified to extend to structural deck or ceiling above suspended ceiling.

G. REVEALS

Provide 1" reveals equal to Fry Reglet drywall reveals Product # DRM-50-100. Reveals shall be painted to match adjacent drywall.

H. LEVELS OF FINISH**.** The following levels of finish are established as a guide for specific final decoration. The minimum requirements for each level shall be as described herein

1. Level 4:

All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of final finishes. See painting/wallcovering specification in this regard.

This level should be specified where flat paints, light textures, or wallcoverings are to be applied.

In critical lighting areas, flat paints applied over light textures tend to reduce joint photographing. Paints with sheen levels other than flat and enamel paints are not recommended over this level of finish.

The weight, texture, and sheen level of wallcoverings applied over this level of finish should be carefully evaluated. Joints and fasteners must be adequately concealed if the wallcovering material is lightweight, contains limited pattern, has a gloss finish, or any combination of these finishes is present. Unbacked vinyl wallcoverings are not recommended over this level of finish.

END OF SECTION

1.0 - GENERAL

1.1 Summary

A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 General Requirements, and Drawings are applicable to this Section.

B. Section Includes:
1. Porcelain Tile
2. Ceramic Tile
3. Quarry Tile
4. Glass Tile
5. Specialty Tile
6. Installation Products; adhesives, mortars, grouts and sealants
7. Waterproof membranes
8. Crack Isolation membranes
9. Thresholds, trim, cementitious backer units and other accessories specified herein.
10. Tile and grout care and maintenance recommendations.

1.2 References

A. American National Standards Institute (ANSI):
1. A108.1 - Installation of Ceramic Tile in a Mortar Bed
2. A108.5 - Installation of Ceramic tile with Dry-Set Portland Cement or Latex-Portland Cement
3. A108.10 - Installation of Grout in Tile work
4. A108.13 - Installation of Membranes for Thin-Set Ceramic Tile
5. A118.3 - Chemical Resistant, Water-Cleanable, Tile-Setting and-Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive
6. A118.4 - Latex-Portland Cement Mortar
7. A 118.5 - Chemical-Resistant Furan Mortar and Grout.
8. A118.6 - Ceramic Tile Grouts
9. A118.7 - Polymer Mortified Cement Grouts
10. A118.10 – Load-Bearing, Bonded Waterproofing Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations
11. A136.1 - Organic Adhesives for Installation of Ceramic Tile
12. A137.1 - Ceramic Tile

B. American Society for Testing and Materials (ASTM):
1. C 136 - Sieve Analysis of Fine and Coarse Aggregates
2. C 144 - Aggregate for Masonry Mortar
3. C 150 - Portland Cement
4. C 207 - Hydrated Lime for Masonry Purposes
5. C 373 - Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
6. C 503 - Marble Dimensional Stone (Exterior)
7. C 623 – Young’s Modulus, Shear Modulus, and Poisson’s Ratio for Glass and Glass-Ceramics by Resonance
8. C 627 – Robinson Floor Test for Tile Service Level
9. C 847-95 Metal Lath
10. C 933-96a Welded Wire Lath

11. C 1028 - Static Coefficient of Friction of Ceramic Tile and Other like Surfaces by the Horizontal Dynamometer Pull-Meter Method
12. D 87 - Melting Point of Petroleum Wax (Cooling Curve)
13. D 226 - Asphalt Saturated Organic Felt Used in Roofing and Waterproofing
14. D 4397 - Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
15. E-90 and E-413 for STC (Sound Transmission Class), E-492 and E-989 for IIC (Impact Insulation Class) – Sound Deadening Underlayments

C. TCA Handbook for Ceramic Tile Installation by Tile Council of America, latest edition

1.3 Submittals

A. Submit shop drawings, product data, and samples under provisions of Section 01350.

B. Shop Drawings:
1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds, and setting details.
2. Locate and detail expansion and control joints.

C. Submit product data, specifications, and instructions for using mortars, adhesives and grouts.

D. Samples:
1. Submit color samples illustrating full color range of each type tile.
2. Grout: Submit manufacturer's full range of standard and designated color samples for each type for Architect's selection.

E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Manufacturer's and installer's qualification data.
3. Manufacturer's instructions.

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.4 Quality Assurance

A. Single Source Responsibility:
1. Obtain each type and color tile material required from single source.
2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
3. Furnish a 10 year guarantee from installation material manufacturer. The guarantee is inclusive of installation materials, finish product, and labor.
4. Obtain prefabricated edge protection and transition and movement profiles from one manufacturer to ensure compatibility.
5. Obtain membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.

B. Manufacturer Qualifications:
1. Tile: Minimum 5 years experience in manufacture of tile products.

2. Setting Materials: Minimum 10 years experience in manufacture of setting and grout materials specified.

C. Installer Qualifications: Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this Project.

D. Certifications:
1. Maintain one copy each of all Referenced standards and specifications on site. Include the TCA Handbook, ANSI A108 Series, ANSI A118 Series ANCI A136.1 and ANSI A137.1 and others as specified under paragraph References.
2. Submit manufacturer's certifications that mortars, adhesives, and grouts are suitable for intended use.

E. Conform to ANSI- Recommended Standard Specifications for Ceramic Tile - A137.1.

F. Conform to TCA Ceramic Tile: The Installation Handbook.

1.5 Delivery, Storage, and Handling

A. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type, and grade.

B. Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.

C. Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.

D. Protect mortar and grout materials against moisture, soiling, or staining.

1.6 Environmental Requirements

A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.

B. Do not begin installation until building is completely enclosed and HVAC system is operating and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.

C. Maintain continuous and uniform building temperatures of not less than 50 degrees F during installation nor more than 100 degrees F.

D. Ventilate spaces receiving tile in accordance with material manufacturers' instructions.

1.7 Warranty

A. Special Project Warranty: Submit a written warranty, executed by the Contractor, Installer, and Manufacturer, agreeing to repair or replace tile that fails in materials or workmanship within the specified warranty period.
1. Warranty Period: 1 year after date of Substantial Completion.

1.8 Extra Materials

A. At completion of project, deliver to Owner extra stock of materials used on project as follows:
   1. Provide 10% of each size, color, and surface finish of tile.
   2. Six lineal feet of each color and type of base.

B. Store in location as directed by Owner.

C. Ensure materials are boxed and identified by manufacturer, type, and color.

1.9 Maintenance Data

A. Submit maintenance data under provisions of Section 01910.

B. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended.

2.0 - PRODUCTS

2.1 Manufacturers

A. Acceptable Manufacturer: Daltile Corporation or pre-approved equal.

B. Requests for substitutions will be considered in accordance with provisions of Section 01360 received 10 days prior to bid.

2.2 Products

A. Ceramic Wall Tile
   1. Manufacturer: Daltile
   2. Product: See Finish Schedule
   3. Color: See Finish Schedule
   4. Size: See Finish Schedule
   5. Finish: See Finish Schedule
   6. Pattern: As indicated on drawings.
   7. Trim Units: Matching bead, bullnose, cove and base shapes in sizes coordinated with field tile.

C. Porcelain Wall Tile
   1. Manufacturer: Glazzio Surfaces
   2. Product: See Finish Schedule
   3. Color: See Finish Schedule
   4. Pattern: As indicated on drawings.
   5. Trim Units: Matching bead, bullnose, cove and base shapes in sized coordinated with field tile.
   1. Pattern: As indicated on drawings.
   2. Trim Units: Matching bead, bullnose, cove and base shapes in sized coordinated with field tile.

F. Glass Mosaic Tile
   1. Manufacturer: SICIS
   2. Product: See Finish Schedule

3. Color: See Finish Schedule
4. Pattern: As indicated on drawings.
5. Trim Units: Matching bead, bullnose, cove and base shapes in sized coordinated with field tile

2.3 Setting Materials

A. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.

B. Epoxy Adhesive: ANSI A118.3, thinset bond type.

C. Mortar Bed Materials:
1. Portland cement: ASTM C150, type 1, gray or white.
2. Hydrated Lime: ASTM C207, Type S.
3. Sand: ASTM C144, fine.
4. Latex additive: As approved.
5. Water: Clean and potable.

D. Mortar Bond Coat Materials:
1. Dry-Set Portland Cement type: ANSI A118.1.
2. Latex-Portland Cement type: ANSI A118.4.
3. Epoxy: ANSI A118.3, 100 percent solids.

E. Epoxy Grout: ANSI A118.8, 100 percent solids epoxy grout; color to be selected.

F. Waterproofing Membrane at Floors: Membrane in accordance with ANSI A118.10.

G. Membrane at Walls: No. 15 (6.9 kg) asphalt saturated felt, ASTM D226, Type

H. Membrane at Walls: 4 mil (0.1 mm) thick polyethylene film, ASTM D4397.

I. Membrane at Walls: Reinforced asphalt paper.

J. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced with 2 inch (50 mm) wide coated glass fiber tape for joints and corners:
1. Thickness: 1/2 inch (13 mm).

2.4 Miscellaneous Materials

A. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout, is compatible with tile and mortar/grout products, and is easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined, tasteless, odorless, containing at least 0.5 percent oil with a melting point of 120-degree F to 140-degree F per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

2.5 Finishing Edge Protection Profiles

A. Manufacturer - Schluter Systems or pre-approved equal. Comply with Section 01360 - Product Substitution and submit at least 10 days prior to Bid. All other approved products shall be notified in writing via addendum.

B. Products:
1. Schluter: Deco Quadec
2. Corners provide matching outside corners as required.
3. Material and Finish: Satin anodized aluminum.
4. Height as required
5. Location as noted on drawings

2.6 Mixing Mortar and Grout

Mix mortars and grouts in accordance with manufacturer's instructions.

3.0 - EXECUTION

3.1 Examination

A. Verify that all wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1, and are ready to receive.

B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces, and are smooth and float within tolerances specified in ANSI A137.1.

C. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.2 Preparation

A. Clean substrates.

B. Wet down or wash dry, dusty surfaces and remove excess water immediately prior to application of tiles.

C. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.

D. Acid Based Cleaners: Use not permitted.

E. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.

F. Do not seal substrate unless required by manufacturer.

G. Prime substrate when required by manufacturer.

H. Membrane
1. Flash membrane up adjacent walls and restraining surfaces.
2. Use preformed cove, corners, and expansion joint flashing.
3. Allow membrane to cure as prior to setting tile.
4. Do not allow construction traffic on membrane.

I. Apply primer-sealer to wood and plywood subfloors when recommended by setting materials manufacturer.

J. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

K. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
1. Petroleum paraffin wax or grout release.

3.3 Installation

A. Cement Board Substrate
1. Place rough side out and fasten with galvanized or resin coated gypsum board screws at 8 inches on center in field of panel and at 6 inches on center at edges.
2. Provide 1/4 inch gap above floor or fixture lip for flexible calking.
3. Maintain manufacturer's required space between board edges.
4. Fill joints by applying tile setting material and joint reinforcement.

B. Vapor Retarder:
1. Extend vapor retarder to extremities of areas indicated to be protected from vapor transmission.
2. Secure in place with mechanical fasteners or adhesives.
3. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
4. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs.
5. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners no greater than 16 inches apart.
6. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape.
7. Repair tears and punctures in vapor retarder immediately before concealing it with the installation of cementitious backer units.

C. Membrane:

1. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.
2. Flash membrane to cure prior to setting tile.
3. Do not allow construction traffic on membrane.

D. Crack Isolation Membrane
1. Install crack isolation membrane over cracks of up to 1/8 inch or greater in substrates. Apply a 12 inch wide strip centered on crack. Install in accordance with manufacturer's recommendations.
2. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.

E. Waterproofing
1. Install waterproofing in strict compliance with manufacturer's instructions.
2. Flash waterproofing up adjacent walls in accordance to manufacturer's details, to a height of 4 inches.
3. Flood test waterproof membranes after fully cured.
4. Field Quality Control water test when required.

F. Tile Installation, General
1. Install tile materials in accordance with ANSI A137.1, other referenced ANSI and TCA specifications, and TCA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.
2. Cut and fit tile tight to protrusions and vertical interruptions and treat with a compatible sealant as specified in Section 07900
3. Form corners and bases neatly.
4. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joint watertight, without voids, cracks, excess mortar, or grout.
5. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of America.

G. Layout
1. Lay out work to pattern indicated so that full tile or joint is centered on each wall and no tile of less than half width need be used. Do not interrupt pattern through openings. Lay out tile to minimize cutting and to avoid tile less than half size.
2. For heights stated in feet and inches, use courses of full tile to produce nearest attainable heights without cutting tile.
3. No staggered joints will be permitted.
4. Align joints in tile in both directions.
5. Align joints between floor and base tile.
6. Make joints between sheets of tile exactly same width as joints within sheet.
7. File edges of cut tile smooth and even.
8. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
9. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as

otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

10. Accurately form intersections and returns.
11. Form internal angles coved and external angles bullnosed.

H. Thin Set Method, Floors and Walls

1. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered. Maintain 90 percent coverage on back of tile and fully bed all corners.
2. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
3. When installing large tiles, ceramics or mosaics, trowel small quantity of mortar or adhesive onto back of each tile or sheet of tiles.
4. Set tiles in place and rub or beat with small beating block.
5. Beat or rap tile to ensure proper bond and also to level surface of tile.
6. Align tile to show uniform joints and allow to set until firm.
7. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.
8. Allow face mounted tile to set until firm before removing paper and before grouting.
9. Sound tile after setting. Replace hollow sounding tiles.

I. Thick Bed Method, Horizontal Surfaces

1. Apply slurry bond coat approximately 1/16 inch thick to substrate surface using flat trowel.
2. Place thick bed mortar, 1-1/4 inch thick nominally onto slurry bond coat while coat is still wet and tacky.
3. Spread prepared mortar approximately one-half desired bed thickness and then lay reinforcing mesh.
4. Lap wire 3 inches and place additional mortar on top of wire to bring bed to required thickness.
5. Rod and compact mortar with steel trowel.
6. Before placing tiles on green or wet screed bed, apply slurry bond coat approximately 1/16 inch thick to mortar using flat trowel.
7. Apply mortar skim coat to back of each tile or sheet of tile immediately prior to placing on bed.
8. Place tiles in wet slurry coat before surface dries maintaining uniform joints.
9. After each tile or sheet of tiles is laid, beat tile with wooden block or rubber mallet to level surface and embed tiles.
10. Perform beating before mortar takes initial set.
11. Pitch surface to drain where required.
12. On hardened screed or mortar bed, install tiles by thin bed method.
13. Sound tiles after setting. Replace hollow sounding tiles.
14. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.

J. Grouting

1. Allow tiles to set a minimum of 48 hours before grouting.
2. If bonding materials are rapid setting, follow manufacturer’s recommendations.
3. Install in accordance with grout manufacturer's recommendations and ANSI A108.10.
4. Pack joints full and free before mortar takes initial set.

5. Clean excess grout from surface with wet cheesecloth as work progresses. Do not use hydrosponges.
6. Cure after grouting by covering with Kraft or construction paper for 72 hours. Install sealant in vertical wall joints at interior corners.

K. Marble Threshold
1. Provide thresholds at wall or framed openings to other building areas not receiving tile.
2. Set one piece threshold in adhesive without voids, full width of door opening.
3. Point threshold base flush with adjoining tile floors.
4. Cope ends to fit door frame profile.

L. Control Joints and Other Sealant Usage
1. Install control joints where tile abuts retaining surfaces such as perimeter walls, curbs, columns, wall corners and directly over cold joints and control joints in structural surfaces conforming to architectural details.
2. Install control joint in floors at spacings as indicated in TCA Installation Handbook, unless noted otherwise.
3. Rake or cut control joints through setting bed to supporting slab or structure. Keep joints free of mortar.
4. Install in accordance with TCA Installation Handbook.
5. Fill joints with self-leveling polyurethane sealant and backing material specified in Section 07910.
6. Fill joints around toilet fixtures with white silicone sanitary sealant. Refer to Section 07910.

M. Expansion Joints:
1. Keep expansion joints free of mortar and grout.
2. Use manufacturer's expansion joint flashing when covering expansion joints with waterproof or crack isolation membranes.
3. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCA EJ171 Expansion Joint requirements.
4. Install sealant in expansion joints.
5. Provide sealant material at items penetrating tile work, unless otherwise indicated.
6. Provide sealants and related materials in accordance with cited ANSI and TCA requirements.

3.4 Adjusting

Sound tile after setting. Replace hollow sounding units.

3.5 Cleaning

A. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.

B. Sponge and wash tile diagonally across joints. Polish with clean dry cloth.

C. Remove grout haze following recommendation of mortar additive manufacturer. Do not use acids for cleaning.

D. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

3.6 Protection

A. Prohibit traffic from floor finish for 72 hours after installation.

B. Where temporary use of new floors is unavoidable, supply large flat boards or plywood panels for walkways over Kraft paper.

C. Protect work so that it will be without any evidence of damage or use at time of acceptance.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

Drawings and general conditions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

1.2 Summary

A. Section Includes:
1. Acoustical ceiling panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:
1. Section 09260 - Gypsum Board
2. Section 09910 - Painting
3. Division 15 Sections - Mechanical Work
4. Division 16 Sections - Electrical Work

C. Substitutions:
1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.
See Section 01360 – Product Substitution for submittal process information and Product Substitution Form.

1.3 References

A. American Society for Testing and Materials (ASTM):
1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

B. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

1.4 Submittals

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.5 Quality Assurance

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
   a. Flame Spread: 25 or less
   b. Smoke Developed: 50 or less

2. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.
   a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.6 Delivery, Storage, and Handling

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.7 Project Conditions

A. Space Enclosure:

All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to and after installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions within the space or with interfacing construction such as walls or soffits. Abnormal conditions include exposure to chemical fumes, vibrations, moisture, excessive humidity, or excessive dirt or dust buildup.

HumiGuard Plus Ceilings: Installation of the products shall be carried out where the temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry. The ceilings must be maintained to avoid excessive dirt or dust buildup that would provide a medium for microbial growth on ceiling panels. Microbial protection does not extend beyond the treated surface as received from the factory, and does not protect other materials that contact the treated surface such as supported insulation materials.

1.8 Warranty

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:

1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
2. Grid System: Rusting and manufacturer's defects
3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

B. Warranty Period Humiguard:

1. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 Maintenance

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

2.0 - PRODUCTS

2.1 Manufacturers

A. Ceiling Panels:
Armstrong World Industries, Inc. USG or pre-approved equal.

2.2 Acoustical Ceiling Units

A. Acoustical Panels Type L1 (without fire guard): Product:
Fine Fissured, 1728
1. Surface Texture: Medium
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Square Lay-In for interface with Prelude XL 15/16" Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264;
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.85.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

D. Acoustical Panels Type L4: Product: Armatuff, 862

1. Surface Texture: Medium
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Square Lay-In for interface with Prelude XL 15/16" Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.50.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Fire Resistive
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.87.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
13. Provide retention clips (Armstrong 414) to secure ceiling tiles in place.

E. Acoustical Panels Type ML: Product: Clean Room VL, 868

1. Surface Texture: Smooth
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Square Lay-In for interface with Prelude Plus XL Fire Guard 15/16" Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, N/A.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 40
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Fire Resistive
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.80.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

2.4 Suspension Systems **(WITHOUT FIRE GUARD CEILING TILES)**

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

1. Structural Classification: ASTM C 635 HD.
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
3. Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

2.5. Suspension System for Use with Clean Room VL, 868

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

1. Structural Classification: ASTM C 635 HD.
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
3. Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

2.7 Accessories

A. Armstrong Retention Clips (#414) attach to main beams and cross tees behind the Armatuff #862 lay-in ceiling. They help to prevent accidental panel displacement by basketballs and other forces from below ceiling, or to ensure a good seal and maintain a positive pressure within the space when used in conjunction with a gasket. A clip should be placed on each side of a 2' x 2' panel and two clips at third points on each 4' cross tee for a 2' x 4' panel.

3.0 - EXECUTION

3.1 Examination of Adjoining Work

Do not proceed with installation until all wet work or work that has become wet such as concrete, CMU, terrazzo, plastering and painting has been completed and thoroughly dried out.

3.2 Preparation

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 Installation

A. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

B. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight. Main beams are to be supported with hanger wires within 8” of vertical surface terminations.

C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

D. Vertical Wall or soffit surfaces intended to be paint finished shall receive the first coat of primer or block fill prior to installation of wall moulding.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 Adjusting and Cleaning

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

C. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.

D. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

A. This specification has been developed to insure the quality of design expected by the Architect. Manufacturers not listed should submit literature, physical samples and installation list of proposed product for pre-approval by the Architect. See Section 01360 for procedures.

B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Description: Wood flooring for gymnasium(s).

A. Quality Assurance:

1. Supplier shall be a firm established in the field: Robbins, Inc. or prior approved equal.

2. Installer shall be a company exhibiting a minimum of ten (10) years continuous experience in the athletic flooring field and approved by the manufacturer.

B. Surface Appearance

1. Expansion spaces will not exceed 1/64” at time of installation and will be spread evenly across the floor with each row of flooring.

2. Expansion spacing will be installed to allow for normal expected increases in Equilibrium Wood Moisture Content. (EMC).

1.3 Submittals:

A. Submit manufacturer’s product data. Suppliers shall submit certificates attesting that materials furnished will meet specifications for grade, quality, dryness and treatment if required.

B. Concrete Guidelines: Submit 3 copies of MFMA recommendations for correct preparation, finishing and testing of concrete sub floor surfaces to receive wood flooring.

C. Samples: Submit for review sample to be made by manufacturer so indicated.

D. Maintenance Literature:
1. Three copies of MFMA Care and Maintenance of wood floors.

E. Submit a floor plan detailing court markings, gamelines and floor sleeves according to applicable regulations in relation to walls and gymnasium equipment.

1.4 Delivery, Storage and Handling:

A. Materials shall not be delivered to the jobsite until all masonry, painting, plastering, tilework, work is complete. All overhead mechanical work, lighting, backstops, and scoreboards shall be installed. Room temperature shall be 55-80 degrees and a consistent relative humidity of 35% to 50% are to be maintained.

1.5 Job Conditions/Sequence:

A. Do not install floor system until concrete has been cured 60 days and the requirements in paragraph 1.4 are obtained.

B. General Contractor is responsible to ensure that slab is clean and free of all dirt and debris prior to floor installation.

C. Permanent heat, light, and ventilation shall be operating and maintained during and following installation. **Maintain a temperature range of 55 to 80 degrees and relative humidity rand of 35% to 50%**.

D. After floors are finished, area is to be locked by owner to allow time for curing of the finish. General Contractor shall protect finished floor until inspection and acceptance.

1.6 Warranty - Guarantee:

A. Guarantee shall not cover damage caused in whole or in part by casualty, ordinary wear and tear, abuse. use for which materials were not designed, faulty construction of the building, settlement of the building walls, failure of other contractor to adhere to specifications, separation of the concrete slab and excessive dryness or excessive moisture from humidity, spillage, migration through the slab or wall, or any other source.

B. Manufacturer hereby warrants the floor system material specified herein to be free from manufacturing defects for a period of (1) one years. This warranty is in lieu of all other warranties, expressed or implied, including but not limited to any warranty of merchantability or fitness for a particular purpose, and any other obligation on the part of manufacturer In the event of the breach of any warranty, the liability of manufacturer shall be limited to repair or replacing the floor material and system components supplied by manufacturer and proven to be defective in manufacture, and shall not include any other damages, either direct or consequential.

2.0 - PRODUCTS

2.1 Manufacturers: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function: Robbins "Bio-Cushion Classic”

Equal products of other manufacturers may be used in the work provided such products have been pre-approved, by the Architect, not less than ten (10) days prior to scheduled bid opening.

2.2 Materials:

A. Membrane - 6 mil polyethylene sheeting

B. Robbins "Bio-Pad" resilient component:

Resilient mount shall be 3/4" EPDM Rubber Isolator Pad

C. Robbins "Bio-Cushion" subfloor system:

1. Lower layer – 15/32" x 4' x 8' CDX plywood. Grade stamped, Exterior grade Fir, Yellow Pine or manufacturer-approved underlayment panel.

2. Upper layer - 15/32" x 4' x 8' CDX plywood. Grade stamped, Exterior grade Fir, Yellow Pine or manufacturer-approved underlayment panel.

3. Subfloor fasteners - One-inch coated staples or equivalent

4. Subfloor adhesive - PL-400 Construction adhesive.

5. Flooring fasteners – Two inch barbed floor cleats or staples

D. Maple flooring - Robbins Inc., 2nd Grade and better., Northern Hard Maple. Flooring to be milled to a minimum thickness of 25/32" x 2-1/4" Xlplus Continuous Strip and graded in accordance with MFMA-FJ grade rules. All flooring to be tongue & grooved, end-matched and kiln-dried. Straight-lay pattern.

NOTE:

Gym : Second Grade maple to be used at main court with Third Grade Maple used at all other areas. Install maple to insure grade change is concealed by painted border at main basketball court.

E. Perimeter base: Robbins Inc. Vent-Cove, or approved equal. Color shall be Black.

F. Finishing material:

1. Bona Sport Sealer or MFMA-approved or Manufacturer approved substitute.
2. Bona Sport Finish or MFMA-approved or manufacturer approved substitute
3. Gameline paint: All painting of lines and symbols on court system shall be Bona, Inc. Industrial enamel colors as selected by the Architect.

G. Expansion joint cover at edge of all wood and concrete: Aluminum, 6" width

3.0 - EXECUTION

3.1. Inspection:

A. Inspect existing floor for proper dryness and tolerance and report any discrepancies to the owner in writing.

B. All work required to put the existing floor in acceptable order shall be the responsibility of this contractor.

C. Subfloor shall be provided to the contractor free of all equipment and broom cleaned.

3.2 Installation:

"Bio-Cushion" flooring system:

A. Install polyethylene with joints lapped a minimum four inches (4").

B. Install EDPM Bio-Cushion pads per Robbins Bio-Cushion subfloor schedule.

C. Position plywood perpendicular to the intended course of the maple flooring. Stagger all joints and space panels 1/4" apart.

D. Install second layer of plywood diagonal to direction of finish flooring. Stagger all joints and space panel 1/4" apart. Secure panel with construction adhesive and staples placed 12" O.C. with perimeter staples placed 6" O.C.

E. Machine nail maple flooring to plywood subfloor straight lay pattern. All end joints shall be driven up tightly and proper spacing allowed for humidity changes affecting the floor. Flooring contractor shall be allowed to incorporate spacer joints in the floor to ensure adequate expansion and to adjust for pattern creep. (See Material for grade change instruction.)

G. Provide 2" expansion voids at all walls and vertical obstructions.

3.1 Finishing:

A. Sanding:

1. Sand floor per manufacturer’s written instructions.

2. After sanding, buff entire floor using 100 grit screen or equal grit sandpaper over entire floor with rotary sander

3. Inspect entire area of floor to insure the floor presents a smooth surface without drum stop marks, gouges, streaks or shiners.

4. Vacuum and/or tack floor to remove all dust and debris prior to first coat of seal.

5. Floor should be clean and completely free of dirt and sanding dust.

3.2 Finishing:

A. Apply specified combination of two coats gym sealer and two coats of gym finish.

B. Gamelines shall be placed on the floor between seal and finish coats. Buff and vacuum and/ or tack between each coat after it dries.

C. Gamelines shall consist of basketball and volleyball courts or as indicated on the drawings.

C. Apply gamelines accurately after the buffing and vacuuming of coated surfaces. Layout in accordance with drawings. For gamelines use current rules of association having jurisdiction. Lines shall be straight with sharp edges in colors selected by the architect.

D. Gamelines:
   1. Gymnasium
      a. 83-10' Main Court Basketball with 30" wide border

E. Submit a floor plan(s) indicating all specified court marking and gamelines to meet all current regulations along with color selections.

F. At Gymnasium, assume 50 - 24" high text characters to be painted in the main basketball border as directed by the Architect.

G. At Gymnasium, provide mascot art at center court. Assume maximum 5 colors. Graphics shall be provided by the Architect.

3.3 Perimeter molding:

Install vented rubber base at all walls with screws or adhesive. Use pre-molded outside corners and neatly miter all inside corners.

END OF SECTION 09551

1.0 - GENERAL

1.1 Section Includes

A. Flooring and accessories as shown on the drawings and schedules as required for complete installation.

1.2 Submittals

A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions for flooring and accessories.

B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.

C. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

D. See Section 01350 – Submittals.

1.3 Quality Assurance and Regulatory Requirements

A. Installer Qualifications: Firm with minimum five years successful experience completing resilient tile installation similar to that required.

B. Provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

C. Materials within each area shall be from one production run as indicated by cartons bearing the same manufacturer’s color code.

D. Materials shall be uniform in thickness and size with accurately cut edges. No seconds, off-goods, or remnants will be allowed.

E. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

F. Pre-Installation Conference: Conduct meeting at site prior to commencing work related to resilient tile installation.

1. Require attendance of parties directly affecting resilient tile installation.
2. Review site conditions, procedures, and coordination required with related work.

1.4 Environmental Conditions

A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

C. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of 100ºF (38ºC) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

D. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently

dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

2.0 - PRODUCTS

2.1 Resilient Tile Flooring Materials

A. Provide “Standard Excelon” Tile Flooring manufactured by Armstrong or pre-approved equal, having a nominal total thickness of 1/8", 12 in. x 12 in. Color and pattern as selected by architect from manufacturer’s full range of colors. Vinyl composition tile shall conform to the requirements of ASTM F 1066, Class 2 – through pattern.

B. Resilient tile patterns shall be indicated on architectural plans. Spacing and patterns shall be as indicated or directed.

2.2 Adhesives

A. For Tile Installation System, Full Spread: Resilient Tile Adhesive under the tile and Wall Base Adhesive at the wall base shall be as manufactured or recommended by the manufacturer of the materials used. Provide epoxy adhesive at “wet” areas.

2.3 Accessories

A. For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), shall be as manufactured or recommended by the manufacturer of the products used.

B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. Provide transition/reducing strips tapered to meet abutting materials as shown on drawings.

D. Provide threshold of thickness and width as shown on the drawings.

E. Provide feature resilient edge strips, 1” wide x 24” length, of equal gauge to the flooring, homogeneous vinyl composition and color as selected by the Architect from standard colors available.

F. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

G. Provide expansion joint cover equal to Construction Services GFST Series. Install per manufacturer’s written instructions.

2.4 Warranty

A. Flooring materials under this section shall be warranted against manufacturing defects for five years from date of substantial completion.

B. Installation shall be warranted for two years from date of substantial completion. Installation warranty shall include guarantee that products have been installed according to manufacturer’s installation instructions, edition which is current at the time of installation.

C. Prorated Manufacturer's Warranty

1. **Within One Year**: If a defect is reported in writing to the manufacturer within one year of final completion, manufacturer will supply new material of the same grade sufficient to repair or replace the defective material. Manufacturer will also pay for reasonable labor costs.

2. **Within Two Years**: If a defect is reported in writing to the manufacturer after one year, but within two years of substantial completion, manufacturer will supply new material of same grade sufficient to repair or replace defective material. Manufacturer will also pay fifty per cent of reasonable labor costs.
3. **After Two Years**: If a defect is reported in writing to the manufacturer after two years, but within five years of substantial completion, manufacturer will supply new material of same grade sufficient to repair or replace defective material.

3.0 - EXECUTION

3.1 Inspection

A. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

B. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

C. Report conditions contrary to contract requirements that would prevent a proper installation. **DO NOT** proceed with the installation until unsatisfactory conditions have been corrected.

3.2 Preparation

A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects as recommended by the flooring manufacturer.

B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.

C. For Tile Installation System, Full Spread perform subfloor moisture testing in accordance with ASTM F 2170, “Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes”, ASTM F 1869,“Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride” or as required by manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 80% and MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D. For Tile High-Moisture Installation Warranty, perform subfloor moisture testing in accordance with ASTM F 2170, “Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes”, ASTM F 1869,“Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”, or required by manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 90% and MVER shall not exceed 7 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed

above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

E. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained

F. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.3 Installation of Tile Flooring

A. Install flooring in strict accordance with the latest edition of Manufacturer's Guaranteed Installation System and recommended work practices from the Resilient Floor Covering Institute.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.

E. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

F. Border pieces less than 6" wide are NOT acceptable.

G. Installation Direction: Quarter-turned unless otherwise indicated by Architect.

3.4 Installation of Accessories

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

D. Apply butt-type and/or overlap metal edge strips where shown on the drawings, before and/or after flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.5 Cleaning and Protection

A. Immediately After Installation

1. Sweep, Dust mop or vacuum the floor thoroughly to remove all loose dust and dirt.
2. Remove any dried adhesive residue with a clean white cloth dampened with mineral spirits, carefully follow warnings on container.
3. Damp mop the floor with a properly diluted neutral detergent solution as recommended by manufacturer.
4. Apply high quality commercial floor sealer and Two (2) coats of high quality commercial floor polish as recommended by manufacturer. DO NOT wet wash, machine scrub or strip the floor for at least 4 to 5 days after installation. This is to prevent excess moisture from interfering with the adhesive bond and/ or seam treatments.

B. Preparation for Use

1. Scrub the floor with a neutral detergent and scrubbing pad as recommended by manufacturer.
2. Thoroughly rinse floor and allow to dry.
3. Apply Three (3) additional coats of high-quality commercial floor polish as recommended by Manufacturer for a total of Five (5) coats for final acceptance.

C. Perform maintenance according to the latest edition of manufacturer's Guaranteed Installation System.

D. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Resilient rubber flooring for commercial traffic.
2. Resilient stair treads (one-piece nosing, tread, and riser).
3. Resilient stair accessories.
4. Resilient wall base, sanitary base, and accessories.
5. Substrate preparation.

B. References (Industry Standards):

3. ASTM International (ASTM):

a.	ASTM F386	Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
b.	ASTM F710	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
c.	ASTM F925	Standard Test Method for Resistance to Chemicals of Resilient Flooring
d.	ASTM F970	Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading
e.	ASTM F1344	Standard Specification for Rubber Floor Products

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions and maintenance guidelines for each material and accessory proposed for use.

B. Samples: Submit three representative samples of each product specified for verification.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide resilient flooring manufactured by a firm with a minimum of 10 years’ experience with resilient flooring of type equivalent to those specified.

1. Manufacturer’s quality management system must have ISO 9001:2000 approval.
2. Provide resilient flooring products and accessories from one manufacturer to ensure compatibility.

3. Manufacturer shall be capable of providing technical training and technical field service representation.

B. Installer Qualifications: Acceptable to manufacturer of resilient flooring or INSTALL (International Standards & Training Alliance) resilient certified for the requirements of the project with a minimum of 4 years' experience with resilient flooring of type equivalent to those specified.

1. It is recommended to have a minimum of one installer per working party with the ability to provide proof of current credentials on request.
2. Has obtained and maintained current credentials from manufacturer's training program.
3. Installers shall be able to exhibit proficient skills with flash cove detailing, both hot and cold-welding techniques, adhesives, specialty adhesive systems and seam cutting.
4. The installing parties shall provide a submittal of their skills in the form of mock-ups of the specified material. These mock-ups will be accepted as proof of their skills and benchmarking for the proposed project.

C. Sustainable Design Requirements:

1. Flooring surfaces that are easily cleaned and do not require coatings, stripping, or use of chemicals that may be hazardous to human health.
2. Flooring that contains no polyvinyl chloride or phthalate plasticizers.
3. Flooring that contains no halogenated polymers.
4. Flooring that contains no asbestos.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.

B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.6 PROJECT CONDITIONS

A. The installation area must be fully enclosed, weather tight, and climate controlled between 63°F and 75°F and 40% to 60% ambient relative humidity (RH) for at least 48 hours prior, during and 72 hours after installation (do not use gas fueled blowers). Dew point must be avoided. The substrate must be at least 5°F above dew point to be considered acceptable.

1.7 WARRANTY

A. Provide manufacturer's standard limited warranty for wear, defect, bond, and conductivity.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis-of-Design: Interface NoraPlan "Coniva" Floor Systems.

2.2 RESILIENT FLOORING FOR COMMERCIAL TRAFFIC

A. Rubber Floor Sheet/Tile:

Rubber floor meets the following product construction specifications:

1.	Product Name:	noraplan convia™, Article 270F
2.	ASTM Specification: ASTM F1344 Standard Specification for Rubber Floor	Type I and Grade 1
3.	Material Composition:	nora vulcanized rubber compound 913 with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium, or mercury
4.	Construction:	Homogeneous rubber compound with a random scattered design
5.	Limited Wear Warranty:	15 years
6.	Color:	28 standard colors
7.	Surface:	Smooth
8.	Back of Flooring:	Double-sanded smooth
9.	Material Size (ASTM F2055): ± 0.45 mm (± 0.018 in) is required	610 mm by 610 mm (~24.015 in by 24.015 in)
10.	Squareness (ASTM F2055): ± 0.45 mm (± 0.018 in) is required	Meets requirements
11.	Thickness (ASTM F386): ± 0.127 mm (± 0.005 in) is required	2 mm (~0.08 in)
12.	Substrate Preparation:	Per ASTM F710 and the nora Installation Instructions
13.	Installation Method:	Directional installation
14.	Cleaning:	Cleaned and maintained effectively using water, nora® pads and a suitable cleaning machine, without the use of any factory and/or field-applied coatings. Also, without using any chemicals that may be hazardous or containing any teratogenic, mutagenic or any other ingredients known to be carcinogenic. Refer to nora Maintenance Guidelines for product specific details.
15.	Shine:	Higher shine achieved by buffing without any artificial topical applied coatings.
16.	Stain Removal:	Samples of the product must be provided for stain removal testing by the owner. Sample size must be 610 mm x 610 mm, pre-cleaned by manufacturer per published recommendations. Samples must have no coatings, sealers, floor finish or other manually or mechanically applied finish on the

	surface of the product. Stain testing must consist of application of common healthcare related disinfectants and chemicals to include, but not limited to, Betadine, Methylene Blue, Silver Nitrate, and alcohol-based hand sanitizer. Duration of test period must be no less than one week. Removal of chemicals must be in accordance with manufacturers published cleaning and maintenance recommendations.

Rubber flooring meets the following performance standards:

1. Dimensional Stability (ASTM F2199): ≤ 0.15% in both directions is required	Meets requirements
2. Flammability (E648/NFPA 253): ≥ 0.45 watts/sq cm for Class 1 is required	NBSIR 75 950, 0.97
3. Smoke Density (ASTM E662): < 450 is required	NBS, 70 (flaming) and 41 (non-flaming)
4. Surface Burning (CAN/ULC-S102.2):	FSC1 of 125 and SD of 370
5. Burn Resistance (DIN EN 1399):	Resistant to cigarette and solder burns
6. Slip Resistance (ASTM D2047): ≥ 0.5 is required	Static coefficient of friction, Neolite dry 0.93, Neolite wet 0.90
7. Bacteria Resistance (ASTM E2180/ASTM G21):	Resistant to bacteria, fungi, and micro-organism activity
8. Latex Allergies (ASTM D6499):	Inhibition ELISA, results are below detection level
9. Sound Absorption (ASTM E2179/ISO 10140-3):	Δ IIC 12, Δ Lw 8 dB (compare only Δ values)
10. Sound Generation:	67.9 dBA, 69.9 dBC and 22 Sones, independently tested
11. Hardness (ASTM D2240): ≥ 85 is required	Shore type A, 92
12. Static Load (ASTM F970): ≤ 0.005 in with 250 lbs is required	Residual compression of 0.003 in with 800 lbs
13. Rolling Load Limit (ASTM F2753):	≤ 450 lbs/sq in, with no forklift traffic
14. Abrasion Resistance (ASTM D3389): ≤ 0.035 oz (1.0 g) is required	1.1 lbs (500 g) load on H-18 wheel with 1000 cycles, 0.008 oz (0.23 g) weight loss
15. Elongation (ASTM D412): ≥ 300 lbs per sq in is required	Modulus @ 10% is 913.1 lbs per sq in
16. Oil & Grease Resistance (ISO 26987):	No

17. Heat Resistance (ASTM F1514): Avg. $\Delta E \leq 8.0$ is required	Easily achieved with all batches and regular maintenance
18. Static Generation (AATCC 134):	< 1000 Volts at 20% RH
19. Thermal Transmission (ASTM C518):	R-value of 0.04
20. Embodied Carbon (Cradle to Gate):	5.87 kg CO_2e/m^3
21. Indoor Air Quality:	GREENGUARD Gold Certified; CDPH 01350 compliant
22. Disclosure of Environmental Impacts:	Environmental Product Declaration (EPD)
23. Disclosure of Product Ingredients:	Health Product Declaration (HPD)
24. Additional Certification and Transparency Documentation:	• Cradle to Cradle Certified® Silver • Greenhealth Approved

2.3 WATER JET DESIGNED LOGO

A. Waterjet cutters shall be used with either between abrasive or pure water cutting.

B. Common materials for logos:

   a. Resilient Materials: Acrylic, polycarbonate, foam, and rubber will be cut cleanly without distortion.

C. Thickness capabilities

   a. Waterjet cutting shall handle a wide range of thicknesses, which will vary based on the material's hardness and the desired cut quality.

D. Tolerances

   a. Waterjet accuracy depends on the machine, material thickness, and cutting speed. Higher-end machines and slower cuts can achieve tighter tolerances.

   b. Standard tolerance: For general logo cutting, a tolerance of ±0.003" to ±0.005" is common.

E. Additional considerations

   a. Kerf (cut width): Standard abrasive waterjet kerf is typically between 0.030" and 0.050". For fine details, this must be considered in the design.

   b. No Heat-Affected Zone (HAZ): No thermal distortion or discoloration of the material is allowed.

   c. Design for bridges: For text or logos with enclosed parts (e.g., the center of an "O" or "P"), designer must add small connectors, or "bridges," to prevent these inner pieces from falling away during cutting.

   d. Minimal finishing: Waterjet cutting shall produce a smooth, "sandblasted" edge that requires minimal or no secondary finishing.

PART 3 - GENERAL

3.1 GENERAL CONTRACTOR RESPONSIBILITIES

A. Supply a safe, climate-controlled building and subfloor as detailed in the nora Installation Instructions (available at www.nora.com)

B. A subfloor that meets the requirements of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring is required, or as detailed in the nora Installation Instructions or nora nTx Installation Instructions as appropriate.

C. A secure storage area that is fully enclosed, weather tight, and climate controlled between 63°F and 75°F and 40% to 60% ambient relative humidity (RH) for at least 48-hours prior and during the installation, so the flooring contractor can acclimate all materials.

D. An installation area that is fully enclosed, weather tight, and climate controlled between 63°F and 75° and 40% to 60% ambient relative humidity (RH) for at least 48-hours prior, during, and 72-hours after installation (do not use gas fueled blowers). If this is not possible, contact the nora Technical Department.

E. Areas with direct prolonged exposure to sunlight should be protected with the use of Low E glass doors, windows or facades that reduce the UV transmissions to less than 1%.

F. Areas of the flooring subjected to direct sunlight, for example through doors or windows, must be covered using blind, curtains, cardboard, or similar materials for 24-hours before, during, and for a period of 72-hours after the installation to allow nora “wet” adhesives to cure. Do not allow traffic when using wet set adhesives for a minimum of 12-hours and prohibit rolling loads for 72-hours. All flooring must be protected from damage during construction operations using Masonite, plywood, or a similar product. Before laying the panels, the flooring surface must be free of all debris. Lay panels so that they are edge to edge and tape the joints to prevent movement and debris entrapment. Inspect the flooring before covering and after removal for final acceptance.

G. Conduct post-installation cleaning after 72-hours for wet set adhesives. Conduct post-installation cleaning immediately for installations using nora dryfix or nora nTx. Refer to the appropriate nora Maintenance Guidelines for product specific details.

3.2 FLOORING CONTRACTOR RESPONSIBILITIES

A. Provide trained installers that have at least one of the following:

1. Approved by specified manufacturer (nora systems, Inc.) or INSTALL (International Standards & Training Alliance) certified for the requirements of the project.
2. It is recommended to have a minimum of one installer per working party with the ability to provide proof of current credentials on request.
3. An effective installation manager to manage the project, installers, and ensure that all the required procedures are followed as detailed in the nora Installation Instructions (available at www.nora.com).

B. Follow all requirements in the appropriate nora Installation Instructions or nora nTx Installation Instructions.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. The Construction Waste Management plan prepared by the Construction Manager for coordination of waste material recycling is hereby incorporated by the reference as requirement of this section. Work under this section shall conform to the provisions outlined in the Plan and shall conform with the local recycling Standards to provide a coordinated effort to maximize reuse of waste materials.

1.2 Submittals

A. Submit for the approval of the Architect samples of each color and type of material. Mark each sample with the manufacturer's name, type material, pattern, color, catalog number, thickness, name of contractor, and name of project.

1.3 Delivery and Storage

A. Deliver materials to site in manufacturer's original, unopened containers clearly marked with manufacturer's brand name, color, and pattern numbers, and production run color code. Care shall be taken to prevent damage and freezing during delivery, handling, and storage.

B. Store materials at site for at least 24 hours before installation.

C. Maintain temperature of spaces where materials are stored and are to be installed at not less than 60° for at least 24 hours before installation. Thereafter, maintain a minimum temperature of 60°F.

2.0 - PRODUCTS

2.1 General

A. Materials shall be uniform in thickness and size with accurately cut edges. No seconds, off-goods, or remnants will be allowed.

B. Colors shall be uniform throughout.

C. Materials within each area shall be from one production run as indicated by cartons bearing the same manufacturer's color code.

D. Interior finish materials shall comply with flame spread limitations and smoke production limitations as follows. Tests shall be performed by an independent testing laboratory.

Walls and Ceilings	Flame Spread	25 or less ASTM E-84.
	Smoke Production	350 or less ASTM E-84.
Floors	Flame Spread	75 or less ASTM E-84.
	Smoke Production	350 or less ASTM E-84.

2.2 Manufacturers

A. Rubber Base Manufacturers
   1. Tarkett (Basis of Design)
   2. Roppe

3. Flexco
4. Mannington

B. Transition Material Manufacturers:
1. Tarkett
2. Roppe
3. Flexco
4. Mannington

C. Requests for substitution shall be considered in accordance with provision of Section 01360 and received by Architect at least 10 days prior to bid.

2.3 Wall Base Materials

A. Rubber Base shall be 4" high x running length. Rubber base shall be Johnsonite, Roppe or approved equal. Base type and color as specified on Finish Legend.

B. Refer to Section 09560 for Flexco Base Specialty.

C. Adhesives, including primer, shall be as manufactured or recommended by the manufacturer of the materials used.

D. Outside corners are to be mitered. V-cut back of base strip to two thirds of its thickness and fold. Use Tool # 532 cove base groover gunlach or equal. Inside corners are to be mitered.

4' lengths or less and pre-mitered corners are not acceptable

E. Provide caulk to fill in at bullnose corners.

2.4 Floor Transition Materials

A. Provide transition strips tapered to meet abutting materials on drawings.

2.5 Adhesives:

A. Wall Base Adhesives shall be as manufactured or recommended by the manufacturer of the materials used. Provide epoxy at "wet areas".
1. Wall Base Adhesives
a. Tarkett/Johnsonite 960 Wall Base Adhesive for porous surfaces
b. Tarkett/Johnsonite 946 Premium Contact Adhesive for non-porous surfaces
c. Tarkett/Johnsonite 965 Flooring and Tread Adhesive
d. Tarkett/Johnsonite 996 Two-Part Epoxy Adhesive
e. Tarkett/Johnsonite 975 Two-Part Urethane Adhesive
2. Caulk: Color Rite Inc.

B. Floor Transitions: Adhesives shall be as manufactured or recommended by the manufacturer of the materials used.

3.0 - EXECUTION

3.1 Inspection

Surfaces to receive rubber base shall meet the minimum requirements established by the rubber base manufacturer. Examine surfaces and correct defects before starting applications.

3.2 Precautions During Installations

A. Spaces in which rubber base material is being set shall be closed to traffic and to other work until the base is firmly set.

B. Where solvent-based adhesive is used, safety sparkproof fans shall be provided and operated when natural ventilation is inadequate. Smoking shall be prohibited.

3.3 Installation

A. Install rubber base materials only after all finishing operations have been completed. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by rubber base manufacturer.

B. Mix and apply adhesive in accordance with the manufacturer's instructions. Cover the area evenly and only to the extent which can be covered with rubber base material in the recommended working time of the adhesive.

C. Base shall be applied in such a manner that the entire under- surface shall be securely bonded in place. Base shall be laid tightly so that each piece is in contact with the adjoining pieces and all joints are in true alignment.

D. Apply resilient base to permanent walls, cabinets, and fixtures in rooms or areas as specified. Install base in as long lengths as practicable. Press down so that bottom cove edge follows floor. Scribe accurately to abutting materials.

3.4 Adjustments

Inspect and make necessary adjustments after heat is applied continuously in finished areas. Any portion of the rubber base which has not seated in a level plane with surrounding base and all damaged, imperfect, or improperly installed base shall be warmed, carefully removed, and new base of the same color and thickness substituted.

3.5 Cleaning and Waxing

Remove stains from base and clean as required and recommended by manufacturer.

3.6 Surplus Materials

Unused runs and one full carton of materials shall be left at the job and turned over to the Owners.

END OF SECTION

1.0 - GENERAL

1.1 Summary

A. Section Includes:

1. The complete installation of a polyurethane surfacing over high-performance resilient base mat, including adhesives, resilient base mat, polyurethane sealer, polyurethane structure layer, surface topcoat, and court markings.

1.2 References

A. Related Standards

1. ASTM 2772, C501, D1894, D3960, F 21701745-97, and F 3191
2. DIN 53505, 18032-2

1.3 Action Submittals

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details and locations of the following:
1. Floor patterns.
2. Layout, colors, widths, and dimensions of game lines and markers.
3. Locations of floor inserts for athletic equipment installed through flooring.

C. Samples: For each exposed product and for each type, color, and pattern specified, 6-inch-square in size and of the same thickness indicated for the Work.

1. Game-Line- and Marker-Paint Samples: Include Sample sets showing game-line- and marker-paint colors applied to flooring.

1.4 Quality Assurance

A. Material Supplier: Shall be single source for all product and accessories.

B. Installer: The complete installation of the flooring system, as described in these specifications, shall be carried out by an experienced installer (Flooring Contractor), and the work shall be performed in accordance with current installation instructions. Data: For resilient athletic flooring to include in maintenance manuals

1.5 Delivery, Storage, And Handling

A. Deliver materials must be delivered in original, unopened and undamaged packaging with identification labels intact.

B. Store the material inside protected from exposure to harmful weather conditions on a clean, dry, flat surface protected from possible damage. Do not stack rolls of material.

C. Storage conditions shall be 60°F to 85°F. Ambient RH shall not exceed 70%.

1.6 Field Conditions

A. Installation of synthetic materials shall not commence until all other finishes and overhead

mechanical trades have completed their work in the synthetic floor areas.

B. Permanent heat, light and ventilation shall be installed and operating during and after installation. Subfloors shall be clean, dry, and free from dirt, dust, oil, grease, paint, old adhesive residue, or other foreign materials.

C. Moderate room temperature of 65° F to 80° F, ambient RH shall be 70% or less which must be maintained for one week prior to, during and 72 hours after installation.

D. Flooring installation shall not begin until moisture vapor emissions, pH level, concrete porosity, and levelness of concrete subfloors have been met. The installation area shall be closed to all traffic and activity for a period to be set by the flooring contractor.

E. After the floor system is installed and the game lines are painted, the area is to be closed to allow curing time for the system. No other trades or personnel are allowed on the floor until the owner has accepted it.

F. Install flooring after other finishing operations, including painting, have been completed.

1.7 Warranty

A. Provide a Manufacturers limited warranty of two (2) years on the materials it has supplied.

2.0 - PRODUCTS

2.1 Manufacturers

A. Basis-of-Design Manufacture: Subject to compliance with requirements, provide Connor “Elastoplast” Sports Flooring installed with sole sourcing of the manufacturers complete system.

B. Other Manufactures: Subject to compliance with all the requirements of this specification including full-spread adhesive coverage provide products by one of the following:

a. Robbins Sports “Pulastic 110” Series
b. Tarkett “Polyturf”

2. All other manufacturers: Submit formal substitution request prior to bid in accordance with Section 012500 - "Substitution Procedures”.
3. Approval by Architect of other manufacturers does not relieve Contractor of responsibility to provide products which comply with all requirements of this specification including full-spread adhesive coverage.

2.2 Resilient Flooring

A. Product Description

1. Flooring: 0.3-inch total flooring thickness equaling 9/32-inch underlayment and 5/64-inch wear surface. All polyurethane components shall be non-hazardous, and shall not contain ANY lead, mercury, heavy metals, PCB, or formaldehyde, and shall be supplied by the manufacturer.
2. Material shall be a very high density, two layer, consisting of a recycled resilient sheet force reduction layer integrated with seamless, liquid applied, and self-leveling 2mm polyurethane topcoat

B. Performance Criteria:

1. ASTM F 2772-11 Indoor Sport Floor Standard:
2. Standard for Indoor Sports System P-1 ASTM 2772
3. Adhesive Solvent Free ASTM D3960
4. Indoor Air Quality (IAQ) Floorscore California 01350
5. Total Volatile Organic Compounds Compliant CDPH/EHLB v1.2-2017
6. Shock Absorption 7mm basemat 24% EN 14808
7. Shock Absorption 9mm basemat 27% EN 14808
8. Coefficient of Friction 1.45 ± ASTM D1894
9. Ball rebound >90 EN 12235
10. Classification P-1 EN 14904
11. Gloss 5-15%
12. System Type Point Elastic EN 14904
13. Tabor Abrasion .06± .01 ASTM C501
14. Resistance to rolling loads 1500 N EN 1569
15. Tensile strength 1000-1400 psi ASTM D412
16. Elongation at break 100-140% ASTM D412
17. Tear strength 65-85 pli ASTM D624
18. Surface Hardness 70-80 Shore A DIN 53505
19. Light (color) fastness Excellent DIN 54004

2.3 Accessories

A. Trowelable patching compound for standard slab surface preparation: Latex-modified, hydraulic-cement-based formulation provided by flooring manufacturer.

2.4 Adhesives

A. Water-resistant type recommended by athletic flooring manufacturer for substrate and conditions indicated.

B. Game-Line and Marker Paint: Complete system including primer, compatible with flooring and recommended by flooring and paint manufacturers.

2.5 Logos

A. General Requirements:

1. Provide logos on the athletic flooring surface as indicated on drawings or as approved by the architect.
2. Logos must be pre-approved artwork provided by Owner or Architect in vector format

B. Material Compatibility:

1. Use a paint system compatible with the flooring topcoat and game line paint.
2. Colors must match approved samples or Pantone numbers provided.

C. Application:

1. Layout logo positions using templates or stencils.
2. Logos must be applied after the topcoat has fully cured and before final protection is installed.
3. Use high-quality masking and application techniques to ensure crisp edges and durability.

D. Protection and Curing:

1. Allow logos to cure fully in accordance with paint manufacturer's instructions.

2. Protect logo areas from all traffic and construction activity until final acceptance

3.0 - EXECUTION

3.1 Inspection

A. Inspect the concrete slab for proper flatness and levelness. Report any discrepancies to the general contractor.

B. Concrete slab shall be broom cleaned by the general contractor.

C. Installer (Flooring Contractor) shall document all working conditions as specified in PART 1 – GENERAL prior to starting the installation. Report any discrepancies to the general contractor.

3.2 Examination And Preparation

A. Review moisture vapor emission and pH test results as supplied by SECTION 01450.

1. Moisture vapor emissions must not exceed 80% RH as per ASTM F2170.
2. pH level should be in the range of 7 to 8.5 per ASTM F710.
3. Slab porosity must be tested per ASTM F 3191

B. Installation shall not be carried out unless the concrete flatness, moisture vapor emissions, Concrete Porosity, and pH requirements as specified are satisfied.

1. Concrete shall be smooth and level, NOT BURNISHED

3.3 Installation

A. Prepare the concrete to receive the flooring material in accordance with installation instructions.
B. Base mat

1. Unroll base mat, fold, and adhere to substrate or unroll directly into spread adhesive. Do not cut the base mat to final dimensions until it is laid into the adhesive.
2. Thoroughly mix the two-component polyurethane adhesive per manufacturer's instructions and apply it directly to the concrete subfloor with a V-notched 3/32" X 3/32" X 3/32" trowel.
3. Install the base mat into the freshly applied adhesive. Do not allow a compression fit at any seam. Roll the base mat with a 100 lb. segmented roller and repeat the rolling process on the entire mat 45 minutes after installation. Allow the adhesive to cure before proceeding to the next step.

C. Scratch Coat

1. Thoroughly mix the two-component Scratch Coat per manufacturer's instructions.
2. Apply two layers of Scratch Coat to the base mat with a flat trowel. Allow each layer to cure a minimum of 8 hours before proceeding to the next application. Inspect for and fill all gaps by applying additional material as needed. Sand down any ridges in the cured Scratch Coat with 100 grit sandpaper.

D. Wear Coat

1. Thoroughly mix the two-component Wear Coat per manufacturer's instructions.
2. Apply the mixed wear coat material using a notched squeegee in one layer. The Wear Coat must be applied wet-into-wet to create a seamless surface. Allow the Wear Coat to cure 12 hours before proceeding to the next application. Sand any imperfections in the finished surface with 100 grit sandpaper.

E. Topcoat

1. Thoroughly mix the three-component water-based urethane Topcoat per manufacturer's instructions.

    a. Apply the mixed material with a paint roller at 250 to 300 square feet per gallon. Allow the Topcoat to cure a minimum of 18 hours before applying the game lines.
    b. Optional application (Contractor's option) - Apply the mixed material with an airless sprayer at 225 to 250 square feet per gallon. Allow the Topcoat to cure a minimum of 18 hours before applying the game lines.

F. Game Lines

1. Use only high-quality masking tape approved by manufacturer.
2. Thoroughly mix the three-component game line paint per manufacturer's instructions.
3. Provide game lines as indicated on drawings.

G. Wall Base - Install vinyl base anchored to the walls with base cement.

H. Remove all excess and waste materials from the work area. Dispose of empty containers in accordance with federal and local statutes.

3.4 Cleaning And Protection

A. Perform the following operations immediately after completing flooring installation:

1. Remove adhesive and other blemishes from flooring surfaces.
2. Sweep and vacuum flooring thoroughly.
3. Damp-mop flooring to remove marks and soil after period recommended in writing by manufacturer.

B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION

1.0 - GENERAL

1.1 Summary

A. Section Includes: Luxury Vinyl tile floor coverings.

B. Cement Based Finishing Underlayment

C. Related Sections:
   1. Division 5 Section: Miscellaneous Metals

1.2 References

A. ASTM International:
   1. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
   2. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
   3. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   4. ASTM F970 Standard Test Method for Static Load Limit.
   5. ASTM F1700 Standard Specification for Solid Vinyl Floor Tile.

B. National Fire Protection Association (NFPA):
   1. NFPA 253 Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Energy Source.
   2. NFPA 258 Research Test Method for Determining Smoke Generation of Solid Materials.

1.3 System Description

A. Performance Requirements:
   1. Fire Performance:
      a. Critical Radiant Flux (NFPA 253 or ASTM E648): Class 1 (0.45 watts per square centimeter or greater).
      b. Smoke Density (NFPA 258 or ASTM E662): 450 or less.

1.4 Submittals

A. General: Submit listed submittals in accordance with Conditions of the Contract and Section 01360 - Submittals

B. Product Data: Submit product data for specified products.

C. Samples: Submit selection and verification samples of finishes, colors and textures.

1.5 Quality Assurance

A. Installer Qualifications: Firm with minimum five years successful experience completing resilient tile installation similar to that required.

B. Provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

C. Materials within each area shall be from one production run as indicated by cartons bearing the same manufacturer's color code.

D. Materials shall be uniform in thickness and size with accurately cut edges. No seconds, off-goods, or remnants will be allowed.

E. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

F. Pre-Installation Conference: Conduct meeting at site prior to commencing work related to resilient tile installation.

1. Require attendance of parties directly affecting resilient tile installation.
2. Review site conditions, procedures, and coordination required with related work.

1.6 Delivery, Storage & Handling

A. General: Comply with Division 1 Product Requirements Section.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

2.0 - PRODUCTS

2.1 Cement Based Finish Underlayment

A. Ardex Feather Finish as approved by Ardex Engineered Cements
1. Self-Drying
2. Waterbased

2.2 Vinyl Tile Floor Covering

A. Manufacturer: Interface

B. Other manufacturers seeking approval must submit product information and comply with Section 01360 - Product Substitution. Information must be received by Architect at least 10 days prior to bid date.

2.3 Materials

A. Level Set Collection LVT: Natural Woodgrains
1. Product No. A002
2. Product Construction: High performance luxury vinyl tile
3. Classification: ASTM F1700, Class III, printed vinyl plank.
4. Wear Layer Thickness: 22 mil
5. Total thickness: 4.5mm

6. Backing Class: Commercial Grade.
7. Finish: Ceramor Coating.
8. Installation Recommendation: Floating Floor with tactiles glue free installation system.
9. Nominal dimensions: 25cm x 1m (9.845in x 39.38in)
10. Installation Methods: Ashlar or Herringbone

2.4 Waterjet Floor Graphic

A. Provide waterjet cut floor design. Size and location located on Architectural drawings. Graphic to be provided by Architect. Waterjet company to provide a dimensioned color rendering for approval prior to production.

B. Cutting of LVT

1. All cutting is to be done with waterjet technology.
2. Orifice size not to exceed 0.005”
3. Waterjet cutting company is to be supplied an electronic file of the design. CAD file is preferred
4. Includes cutting and assembly of the designs, and the field that surrounds.

C. Preparation for Shipping of LVT Tiles

1. Entire project to be checked for accuracy prior to boxing which Includes verifying that each assembled piece fits correctly. Depending on the size of the design ours are laid out and photographed prior to packaging.
2. Tiles to be packaged in the same boxes that they were received in.
3. Each box to always have labels indicating contents of box.
4. First box to be opened will be clearly marked. This would depend on the design and how the installer wishes to proceed; we usually try to determine this prior to cutting.
5. Boxes to be palletized, shrink wrapped and banded to the pallet
6. Waterjet cutting company will be available in case of emergency.
7. Installer to be notified in writing of the importance of having a smooth flat surface.
8. Shipment to be insured by shipper. Shipping and insurance to be provided at customer’s expense

D. Installation

1. Installer to dry lay all waterjet designs prior to final installation.
2. Installer to notify waterjet company of any concerns prior to final installation.

3.0 - EXECUTION

3.1 Manufacturer’s Instructions

A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 Finishing Underlayment

A. Clean and prepare the full extent of the existing concrete floor scheduled to receive flooring under this section.

B. Provide new Ardex feather finish underlayment as recommended by the manufacturer to achieve a uniform, level substrate surface throughout the entire area to receive flooring products specified under this section.

3.3 Examination

A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under this section, are acceptable for product installation in accordance with manufacturer's instructions.

3.4 Preparation

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.5 Protection

A. Protect installed products until completion of project.

B. Repair or replace damaged products prior to Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. High-performance resinous flooring systems.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Installer Certificates for Qualification: Signed by manufacturer stating that installers comply with specified requirements.
C. Samples: Submit two 6” X 6” samples of each resinous flooring system applied to a rigid backing. Provide sample which is a true representation of proposed field applied finish. Provide sample color and texture for approval from Owner in writing or approved by General Contractor prior to installation.
D. Product Schedule: For resinous flooring.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.
   1. Engage an installer who is approved in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
   2. Installer Letter of Qualification: Installer to provide letter stating that they have been in business for at least 5 years and listing 5 projects in the last 2 years of similar scope. For each project provide: project name, location, date of installation, contact information, size of project, and manufacturer of materials with system information.
B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
C. Pre-installation Conference: Conduct conference at Project site before work and mockups begin.
D. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Do not cover up mockup area.
   1. Apply full-thickness mockups on 16 square foot floor area selected by Architect.
   2. Finish surfaces for verification of products, color, texture, and sheen.
   3. Simulate finished lighting conditions for Architect's review of mockups.
   4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
   5. Mockup shall demonstrate desired slip resistance for review and approval by Owner’s representative in writing.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by:
1. The Sherwin Williams Company.

B. Resuflor Deco Flake BC, 20-30 mils nominal thickness.
1. Primer: Resuprime 3579 at 200-300 sq. ft. per gallon.
2. Body Coat: Resuflor 3746 at 200-300 sq. ft. per gallon.
3. Broadcast: Decorative Flakes 6750 or 6755 to excess at 100-200 lbs. per 1,000 sq. ft.
4. Grout Coat: Resuflor 3746 at 160-250 sq. ft. per gallon.
5. Seal Coat: Resutile 4686 at 250-400 sq. ft. per gallon.

C. Substitutions: Allowed as per Specification Section 01360 and approved by the Architect.

2.2 MATERIALS

A. VOC Content of Resinous Flooring: Provide resinous flooring systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
1. Resinous Flooring: 100 g/L.

2.3 HIGH-PERFORMANCE RESINOUS FLOORING

A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, high-performance, resin-based, monolithic floor surfacing designed to produce a seamless floor.
B. System Characteristics:
1. Color and Pattern: As indicated from manufacturers listed above.
2. Slip Resistance: Provide slip resistant finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Inspection: Prior to commencing Work, thoroughly examine all underlying and adjoining work, surfaces and conditions upon which Work is in any way dependent for perfect results. Report all conditions which affect Work. No "waiver of responsibility" for incomplete, inadequate or defective underlaying and adjoining work, surfaces and conditions will be considered, unless notice of such unsatisfactory conditions has been filed and agreed to in writing before Work begins. Commencement of Work constitutes acceptance of surfaces.
B. Surface Preparation: Remove all surface contamination, loose or weakly adherent particles, laitance, grease, oil, curing compounds, paint, dust and debris by blast track method or approved mechanical means (acid etch not allowed). If surface is questionable, try a test patch. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732.
C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
1. Moisture Testing: Perform tests indicated below.

a. Calcium Chloride Test: Perform anhydrous calcium chloride test per ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water/1000 sq. ft. in 24 hours. Perform tests so that each test area does not exceed 1000 sq. ft. and perform 3 tests for the first 1000 sq. ft. and one additional test for every additional 1000 sq ft.

b. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.

3.2 ENVIRONMENTAL CONDITIONS

A. All applicators and all other personnel in the area of the RF installation shall take all required and necessary safety precautions. All manufacturers' installation instructions shall be implicitly instructions shall be implicitly followed.
B. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
C. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
E. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
F. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.3 APPLICATIONS

A. Install resinous floor over properly prepared concrete surface in strict accordance with the manufacturer's directions.
   1. Install the primer and/or base coats over thoroughly cleaned and prepared concrete.
   2. Install topcoat over flooring after excess aggregate has been removed.
   3. Maintain a slab temperature of 60°F to 80°F for 24 hours minimum before applying floor topping, or as instructed by manufacturer.
B. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
   1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
   2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
   3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
C. Sealant: Saw cut resinous floor topping at expansion joints in concrete slab. Fill sawcuts with sealant prior to final seal coat application. Follow manufacturer's written recommendations.
D. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
E. Slip Resistant Finish: Provide grit for slip resistance.
F. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.4 COMPLETED WORK

A. Cleaning: Upon completion of the Work, clean up and remove from the premises surplus materials, tools, appliances, empty cans, cartons and rubbish resulting from the Work. Clean off all spattering and drippings, and all resulting stains.
B. Protection: Protect Work in accordance with manufacturer's directions from damage and wear during the remainder of the construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
C. Contractor shall insure that coating is protected from any traffic until it is fully cured to the satisfaction of the coating manufacturer.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

A. Acoustical wall panels.

1.2 Related Sections

A. Section 09260 - Gypsum Board Assemblies.

B. Section 09510 - Suspended Acoustical Ceilings: Conventional grid-supported acoustic ceilings.

C. Section 09910 - Paints and Coatings.

1.3 References

A. ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2000.

B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2000a.

1.4 Performance Requirements

A. Acoustical Absorption: Perform testing in accordance with ASTM C 423, Type A mounting method unless otherwise specified.

B. Flame Spread Rating: Provide all components with Class A flame spread rating when tested in accordance with ASTM E 84, unless otherwise specified.

1.5 Submittals

A. Submit under provisions of Section 01350.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Independent testing agency test reports.

C. Selection Samples: For each product specified, two complete sets of color samples representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.6 Quality Assurance

A. Manufacturer Qualifications: Minimum 10 years of experience in producing acoustical products of the types specified herein.

B. Installer Qualifications: Acceptable to the manufacturer of the acoustical products being installed.

1. Install acoustical products in areas designated by Architect.
2. Do not proceed with remaining work until Architect approves workmanship and appearance.
3. Approved mock-up may remain as part of the work.

1.7 Delivery, Storage, And Handling

A. Protect acoustical products from moisture during shipment, storage, and handling.

B. Store products in manufacturer's unopened packaging until ready for installation.
1. Store materials flat, in dry, well-ventilated space.
2. Do not stand panels on end.
3. Protect edges from damage.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 Project Conditions

A. Do not begin installation of acoustical products until building has been enclosed and environmental conditions approximate those that will prevail when building is occupied.

B. Environmental Requirements: Do not install panels until wet work, such as concrete and plastering, is complete; the building is enclosed; and the temperature and relative humidity are stabilized at 60 – 80 degrees F (16 – 27 degrees C) and 40% to 50%, respectively.

1.9 Extra Materials

A. Provide 5 percent, but not less than 1 of each type of acoustical unit actually installed, for Owner's use in maintenance.

2.0 PRODUCTS

2.1 Manufacturers

A. Basis of Design - Manufacturer: G&S Acoustics

B. Requests for substitutions will be considered in accordance with provisions of Section 01360. Submit for pre-approval at least 10 days prior to bid.

C. Provide all acoustical products specified herein by a single manufacturer.

2.2 Acoustical Wall Panels

B. Painted Wall/Ceiling Panels: Pinta panels; core of 6 to 7 pcf (96 to 112 kg/cu m) fiberglass, with chemically hardened edges and a paintable scrim fiber facing sheet.
1. Core Thickness: 2 inch (51 mm); NRC 1.05.
3. Size: As indicated.
4. Finish: Latex paint as selected from manufacturers standards
5. Color: As scheduled, see finish schedule
6. Edges: Square and painted.
7. Corners: Square.
8. Wall Panel Mounting: Adhesive.
9. Wall Panel Mounting: Angled Impaling clips.

2.3 Accessories

A. Mounting Adhesive: Water-based, heavy-bodied adhesive as recommended by manufacturer of acoustical panels.

B. Impaling Clips. Manufacturer's standard 3 by 4 inches (75 by 100 mm) galvanized mounting clips designed for impaling back side of fiberglass units.

C. Two-Part Z-Clips: Manufacturer's standard mounting bar and matching clips for mounting on rear of acoustical panels.

3.0 EXECUTION

3.1 Examination

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 Preparation

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 Installation

A. Install acoustical units in accordance with manufacturer's instructions.

B. Adhesive Mounting: Size back of panels at 18 inch (450 mm) on center in both directions with thin coating of adhesive in 4 inch (100 mm) squares. Center adhesive dabs the size of a large egg on each sized area, and press panel firmly against substrate, flattening adhesive. Block panel for not less than 24 hours until adhesive has set.

C. Impaling Clips: Fasten clips to wall at 48 inches (1220 mm) on center, with points facing upward. Attach panels by pressing downward and toward the wall, so points of clips are embedded firmly in back of panel.

D. Two-Part Clips: Fasten bars to wall at 48 inches (1220 mm) on center in both directions. Impale matching mechanical clips into back of panels in matching pattern and drop panel into position so clips fully engage into wall-mounted bars.

3.4 Protection

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 Summary

A. Section Includes:
Cementitious wood fiber plank acoustical wall system

B. Related Sections:
1. Section 09260 –Gypsum Board
2. Divisions 15 – HVAC Air Distribution
3. Division 16 – Electrical

C. Product Substitution
1. Prior Approval: Proposed product substitutions may be submitted no later than TEN (10) days prior to the date for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards. Comply with Section 01360 - Product Substitution.

1.3 References

A. American Society for Testing and Materials (ASTM)
1. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
2. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
4. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
5. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code

C. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

D. NFPA 70 National Electrical Code

E. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.1 2010

F. L.E.E.D. - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

1.4 Submittals

A. Product Data: Submit manufacturer's technical data for each type of Direct-Attached™ walls required.

B. Samples: Minimum 6 inch x 6 inch samples of specified Direct-Attached wall panels.

C. Shop Drawings: Layout and details of Direct-Attached wall panels show locations of items that are to be coordinated with the installation.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. Acoustical performance, products must be tested to the A, D-20, C-20, or C-40 method; each carton of material must carry an approved independent laboratory classification.

E. If the material supplied by the acoustical subcontractor does not conform to manufacturer's current published values as specified in 2.2 of this specification, the material must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.5 Quality Assurance

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical wall components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.

C. Direct-Attached Wall Panels, as with other architectural features located at the wall, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate acoustical wall work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 Delivery, Storage & Handling

A. Deliver acoustical wall units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Provide labels indicating brand name, style, size and thickness.

C. Before installing acoustical wall units, permit them to reach room temperature and a stabilized moisture content.

D. Handle acoustical wall units carefully to avoid chipping edges or damaged units in any way.

1.7 Project/Site Conditions

A. Environmental Requirements:

B. Do not install wall panels until building is closed in and HVAC system is operational.

C. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.

D. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:
1. Relative Humidity: 65 - 75%.
2. Uniform Temperature: 55 - 70 degrees F (13 - 21 degrees C).

1.8 Warranty

A. Direct-Attached Wall Panels: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
1. Direct-Attached Wall Panels: Sagging and warping

B. Direct-Attached Wall Panels one source manufacturer is Thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 Maintenance

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Direct-Attached Wall Panels: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2.0 - PRODUCTS

2.1 Manufacturer (Basis of Design)

A. Tectum® Direct-Attached Wall Panels:
1. Tectum® by Armstrong World Industries, Inc.

B. Suspension System and Accessories:
1. Armstrong World Industries, Inc.

2.2 Direct-Attached Wall Panels

A. Tectum Wall Panels Type TWP-1, TWP-2:
1. Surface Texture: Coarse
2. Composition: Aspen wood fibers bonded with inorganic hydraulic cement
3. Color: Painted as directed
4. Size: Standard 23 ¾" x 96" and 47 ¾" x 96"
5. Thickness: Standard 1"
6. Edge Profile: long edge beveled, short edge square
7. Noise Reduction Coefficient (NRC): ASTM C 423 ; Mounting; C-20(0.80)
8. Flame Spread: ASTM E 1264; Class A
9. Light Reflectance (LR) White Panel: ASTM E 1477
10. Dimensional Stability: HumiGuard Plus
11. Sustainable: EPD (Environmental Product Declaration) and HPD (Health Product Declaration)

2.3 Metal Suspension Systems

A. Accessories:
1. #6 x 1-5/8" Painted Head Sharp Point Screws, item 8187L16
2. 2-1/4" Painted Head CMU Screws, item8189L22

3.0 - EXECUTION

3.1 Examination

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 Preparation

A. Measure each wall area and establish layout of wall units. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other wall anchors whose installation is specified in other sections.
1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 Installation

A. Install Direct-Attached Wall Panels in accordance manufacturer's installation instructions.

3.4 Adjusting And Cleaning

A. Replace damaged and broken Wall Panels.

B. Clean exposed surfaces of acoustical walls, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any Wall Panels that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

END OF SECTION

1.0 - GENERAL

1.1 Scope

A. The work under this section consists of all painting, finishing work and related items.

B. Paint or Painting shall include sealers, primers, stains, and oil, alkyd, latex and enamel paints and the application of these materials on surfaces prepared to produce a complete job whether or not every item is specifically mentioned. Where items are not mentioned they shall be furnished as specified for similar work.

Only work specifically noted as being excluded shall be left unfinished.

C. This specification includes field painting of all exposed piping, ductwork, conduit, hangers, mechanical and electrical equipment in finished spaces. A finished space is one listed in the Finish Schedule as having finish materials on walls and/or ceiling.

1.2 List of Proposed Materials

The contractor shall either verify in writing that he intends to apply the products listed in the Paint Schedule, or shall submit for approval a list of comparable materials of another listed approved manufacturer. This submittal shall include full identifying product names and catalog numbers.

1.3 Submittals

As soon as practicable after contract is let, submit for approval a detailed schedule of the paint proposed, listing the name of each product, and the surface to which it will be applied. Omission of any item from the approved schedule shall not relieve Contractor of his obligation.

1.4 Storage of Materials

A. Deliver all painting materials to job site at least three (3) days before beginning painting, in original unbroken containers showing manufacturers name and type of paint, subject to Architect's inspection and approval.

B. All materials used on the job shall be stored in a single place. Such storage place shall be kept neat and clean, and all damage thereto or its surroundings shall be made good. Any soiled or used rags, waste, and trash must be removed from the building every night, and every precaution taken to avoid the danger of fire.

1.5 Protection of Other Work

The painting contractor shall furnish and lay drop cloths in all areas where painting is being done to protect floors and other work from damage. He shall be responsible for any damage to other work and shall replace any materials which have been damaged to such an extent that they cannot be restored to their original condition. All damage must be repaired to the satisfaction of the Architect.

1.6 Job, Weather, and Temperature Conditions

A. Maintain temperature in building at constant 65^{o} F. or above and provide adequate ventilation for escape of moisture from the building in order to prevent condensation mildew, damage to other work, and improper drying.

B. Exterior painting shall not be done when the temperature is below 50^{o} F., while the surface is damp, or during cold, rainy, or frosty weather, or when the temperature is

likely to drop to freezing within 24 hours. Avoid painting surfaces while they are exposed to hot sun.

C. Before painting is started in any area, the area shall be broom cleaned and excessive dust shall be removed from all areas to be painted. After painting operations begin in a given area, clean only with commercial vacuum cleaning equipment.

D. Adequate illumination shall be provided in all areas where painting operations are in progress.

1.7 Inspection of Surfaces

A. Before starting any work, surfaces to receive paint finishes shall be examined carefully for defects which cannot be corrected by the procedures specified under paint manufacturers recommended "Preparation of Surfaces" and which might prevent satisfactory painting results. Work shall not proceed until such damages are correct.

B. At areas of existing previously painted surface, the painting contractor shall field verify to assure compatibility between existing paint / coating material and the proposed new paint / coating material prior to procuring such new materials or products. Should a material or product compatibility conflict be discovered, the Contractor shall immediately notify the Architect for direction prior to proceeding with procuring such materials or products.

C. The beginning of work in a specific area shall be construed as acceptance of the surfaces and the Contractor shall be fully responsible for satisfactory work.

1.8 Cooperation With Other Trades

A. This work shall be scheduled and coordinated with other trades and shall not proceed until other work and/or job conditions are as required to produce satisfactory results.

B. The contractor shall examine the specifications for the various trades and shall thoroughly familiarize himself with all provisions regarding painting. All surfaces that are left unfinished by the requirements of other sections shall be painted or finished as part of the work covered by this section.

1.9 Maintenance Material

The contractor shall turn over to the Owner at the final inspection one gallon of each type and final color of the paint used on the project.

2.0 - PRODUCTS

2.1 Materials

A. Except where otherwise specifically stated hereinafter, painting materials shall be products of one of the following manufacturers without substitution of Equal, and shall be in that manufacturer's top grade of the respective type Sherwin-Williams (Basis of Design). The term top grade refers to the manufacturers advertised line of best quality and not to Professional of maintenance lines. Any deviations from the requirements of this article shall be only by written change order with contract price adjusted accordingly.

B. If job-mixed paints are used, submit proposed formulas for approval before proceeding with work. Thinning and tinting materials shall be as recommended by the manufacturer of the material used.

C. Paints and finishing materials shall be free from skins, lumps, or any foreign matter when used, and pigments, fillers, etc., shall be kept well stirred while being applied.

D. Interior finish materials shall comply with flame spread limitations and smoke production limitations as follows:

Walls and Ceilings - Flame Spread - 25 or less ASTM E-84.
Smoke Production - 350 or less ASTM E-84.

2.2 Colors

A. Not limited to stock ready-mixed colors. Bring to directed shades or tones by mixing.

B. In two-coat or three-coat work use slightly different colors for different coats to avoid skipping.

C. Accent or feature areas when indicated shall be colors as selected. Color spacing and pattern shall be as indicated and/or directed. Maximum three (3) colors per area.

D. Complete color scheme shall be as indicated on Finish Legend and Schedule.

2.3 Accessory Materials

Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, dusters, cleaning solvents, and waste as required to perform the work and achieve the results specified herein.

3.0 - EXECUTION

3.1 Workmanship

A. Surfaces shall be clean, dry, and free of oil, grease, dirt, mildew, loose or peeling paint, loose wood particles, and in proper condition for painting. All work shall be carefully done by skilled mechanics. Finished surfaces shall be uniform in coverage, gloss, finish and color, and free from brush marks. All coats shall be thoroughly dry before applying succeeding coats.

B. Do all work in strict accordance with manufacturer's label directions.

C. Hand sand woodwork until smooth and free from raised grain and other surface imperfections. First coat shall be applied before erection, to all surfaces, front and back. After woodwork is primed, fill nail holes, cracks, etc., full and smooth with putty. Lightly sand between coats where necessary in accord with good practice. Fully finish the top and bottom edges of doors and other woodwork edges not normally visible. Shellac knots and pitch streaks before painting.

D. On concrete or masonry, do no painting until the surface has dried to the equivalent of eight days drying time under well ventilated conditions in good drying weather.

E. Vertical surfaces to Interface with suspended acoustical panel ceiling shall be primed/filled to a minimum of 8” about finish ceiling elevation prior to the installation of the acoustical panel ceiling perimeter wall edge molding/trim.

F. Wash metal surfaces with mineral spirits to remove any dirt, grease, before applying materials. Where rust or scale is present, use wire brush, or sandpaper clean before painting. Clean shop coats of paint that become marred and touch up with specified primer.

G. Treat galvanized metal surfaces chemically with compound designed for this purpose, apply as per manufacturer's directions before applying first paint coat.

H. Remove and protect hardware panels, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Upon completion of each space, carefully replace all removed items.

I. Exterior doors shall have tops, bottoms, and side edges finished the same as the exterior faces of these doors.

Interior door shall have vision windows, louvers, grilles, etc. Finished to match door frame.

J. All closets and the interior of all cabinets shall be finished the same as adjoining room paint or stain unless otherwise scheduled. All other surfaces shall be finished the same as nearest or adjoining surfaces unless otherwise scheduled or directed.

3.2 Schedule

A. Exterior Metals

1. Galvanized metal shall be solvent clean with VM&P Naphtha.
   a. Prime: S-W: Procryl Primer B66W1310
   b. Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series

2. Non-primed metal shall be cleaned and etched with approved acid and washed with water.
   a. Prime: S-W: Kem Kromik Universal Primer, B50-Z Series
   b. Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series

3. Primed metals shall be inspected, scuffs, and abrasions sanded free of rust and receive full coat of primer. Concealed metal surfaces shall be back primed.
   a. Prime: S-W: Kem Kromik Universal Primer, B50-Z Series
   b. Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series

B. Interior Metals

1. Non-primed metal shall be primed under this section.
   a. Prime: S-W: Kem Kromik Universal Primer, B50-Z Series
   b. Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series

2. Primed metal shall have scratches and abrasions sanded free of rust and receive one full coat of primer.
   a. Prime: S-W: Kem Kromik Universal Primer, B50-Z Series
   b. Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series

C. Exterior Wood

1. Exposed wood of every description.
2. Prime: S-W Exterior Oil-Based Wood Primer, Y24W8020
3. Finish: Two (2) coats, B54-150 Series

D. Interior Woodwork and Trim

1. Prime: One (1) coat, S-W Easy Sand Interior Oil-Based Primer, B49W8040
2. OPTION: S-W ProBlock Interior Oil-Based Primer, B70W8810

3. Finish: Two (2) coats – S-W Pro Mar 200 Interior Alkyd Semi-Gloss, B34-200 series or Gloss, B35-200

E. Gypsum Board and Plaster
1. Prime: One (1) coat, S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600
2. Finish: Two (2) coats – S-W Pro Industrial Waterbased Pre-Catalyzed Epoxy Eg-Shel, K-45-157 Series

F. Exposed Exterior Concrete and Concrete and/or Clay Brick Masonry
1. Masonry Primer: One (1) coat, S-W Loxon Concrete and Masonry Primer/Sealer, A24W8300
2. Block Filler: One (1) coat, S-W Pro Industrial Heavy Duty Acrylic Block Filler, B42W151
3. Finish: Two (2) coats, S-W A-100 Exterior Latex, Flat, A6 Series

G. Interior Concrete and Concrete Masonry
1. Concrete masonry surfaces shall be filled unless noted otherwise.
   a. Block Filler: One (1) coat, S-W Pro Industrial Heavy Duty Acrylic Block Filler, B42W151
   b. Finish: Two (2) coats – S-W Pro Industrial Waterbased Pre-Catalyzed Epoxy Semi-Gloss, K-46-153 Series

2. Concrete (Cast in Place or Precast, Smooth)
   a. Primer: One (1) coat, S-W Loxon Concrete and Masonry Primer/Sealer, A24W8300
   b. Finish: Two (2) coats – S-W Pro Industrial Waterbased Pre-Catalyzed Epoxy Semi-Gloss, K-46-153 Series

3. **Sealed Concrete (SC):** Concrete MUST be etched, with H&C® Concrete Etcher or muriatic acid, following label directions.
   a. Reducer/Cleaner --- Aromatic 100, R2K5, or R7K65
   b. Brush – Use natural bristle brushes
   c. Roller – Use a 1/4" – 3/8" nap woven or other solvent-resistant cover
   d. Freshly stained or painted surfaces will require cure time before any application of this H&C® High Performance Industrial Clear. Follow manufacturer's instructions and recommendations

H. Interior Wood Doors and Natural Finish Wood
1. One (1) coat, S-W Wood Classics Interior Oil Stain, A49 Series
2. One (1) coat, S-W Wood Classics Polyurethane Varnish, Satin, A67F1
3. One (1) coat, S-W Wood Classics Polyurethane Varnish, Gloss, A67V1

I. Stenciled Wall Identification

At Barrier Walls provide one coat red color stencil identification on walls above ceilings of corridor, Smokestop, Horizontal Exit, enclosures and Firewalls. Accordingly, wording shall be:

1. Wording for fire walls shall indicate the rating and:
   a. Fire Barrier - Protect All Openings
   b. Both sides of wall are to be stenciled above the ceiling with one stencil sign to be placed above ceilings on all separate areas and maximum of 20'-0 o.c.

2. Wording for smoke barriers:
   a. Smoke Barrier - Protect All Openings
   b. Both sides of wall are to be stenciled above the ceiling with one

stencil sign to be placed above ceilings on all separate areas and maximum of 20'-0 o.c.

J. Exposed Ceiling Painting (Dryfall)
Primer: Pro Industrial Pro-Cryl Primer (1 coat)
Finish: Waterborne Acrylic Dry Fall Flat (1-2 coats)
B42W00001

3.3 Material Application

A. All materials shall be applied in complete accordance with manufacturer's printed instructions.

B. All coats shall be thoroughly dry before the succeeding coat is applied.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work under this section consists of all markerboards and tack boards.

1.2 Submittals
Submit for approval completely detailed shop drawings including dimensions, construction details, materials, finish, and details of adjacent construction.

1.3 Manufacturer
The specifications and drawings are based on products of Claridge Products and Equipment Company to illustrate the standard of quality. Equivalent products by American Visual Display Products, LLC and PolyVision will be acceptable.

1.4 Guarantee
The Markerboards and Tack boards Contractor shall guarantee all materials and workmanship covered by this section for a period of one (1) year from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.

2.0 - PRODUCTS

2.1 Markerboards

A. Markerboards shall be Claridge LCS 24-gauge Porcelain Enamel steel skin with 3/8" particle board core and .015" thick aluminum sheet backing, typical 4'-0" high x 12'-0" long. (other sizes as indicated). Color to be #32 LCS White. ("MB" as designated on plans.) Nontypical sizes shall be indicated.

2.3 Trim

A. Provide concealed mounting for Factory Built Units with Series #3, 1-1/4" trim as indicated, using a hollow marker tray at markerboard only. Provide premoulded end covers at all markertrays.

B. Provide full length map rail No. 74 with cork insert at top of markerboard with end stops. Provide 76M display hooks, 76-R.B. roller brackets, and 76-F.H. flag holders for each section.

C. Standard end and mullion trim between marker and tack boards.

D. All trim to be extruded aluminum with satin anodized finish.

2.4 Map and Display Rail

A. Rail shall be No. 74 extruded aluminum with 1/4" thick cork insert, 1" wide, length required by drawings.

B. Provide 74ES end caps for each section, No. 76M metal display hooks (24" o.c.).

3.0 - EXECUTION

3.1 Installation

A. Installation shall be mechanically anchored in accordance with the manufacturer's recommendations. All joints flush and neatly joined. No Glue shall be used.

B. Wash markerboards with water and detergent cleaner.

C. Contractor shall affix manufacturer's instructions to each Marker/Tack board unit which includes complete instructions on proper BREAKING IN of the markerboard.

D. Mounting heights shall be verified by the Owner prior to installation.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this Section.

1.2 Related Work Specified Elsewhere

Mechanical Louvers: MECHANICAL - Division 15

1.3 Description of Work

A. Extent of architectural louvers and vents is indicated on architectural drawings, including indications of sizes, shape and locations.

B. Types of Louvers and Vents Including the Following: Extruded aluminum louvers.

C. Sealants including installation are specified in Division 7.

D. Field-applied paint is specified in Division 9.

E. Louvers in hollow metal doors and frames are specified in Division 8.

1.4 Quality Assurance

A. Performance Requirements: Where louvers are indicated to comply with specific performance requirements, provide units whose performance ratings have been determined in compliance with Air Movement and Control Association (AMCA) Standard 500.

AMCA Certification: Where indicated, provide louvers with AMCA Certified Ratings Seal evidencing that product complies with above requirement.

B. Comply with SMACNA “Architectural Sheet Metal Manual” recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

C. Field Measurements: Verify size, location and placement of louver units prior to fabrication, wherever possible.

D. Shop Assembly: Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Preassemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.5 Submittals

A. Product Data: Submit manufacture’s specifications; certified test data, where applicable; and installation instructions for required products, including finishes.

B. Shop Drawings: Submit shop drawings for fabrication and erection of louver units and accessories. Include plans, elevations and details for sections and connections to adjoining work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.

C. Samples: Submit 6" square samples of each required finish. Prepare samples on metal of same gage and alloy to be used in work. Where normal color and texture

variations are to be expected, include 2 or more units in each sample showing limits of such variations.

2.0 PRODUCTS

2.1. Acceptable Manufacturers

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Airline Products Co.
The Airolite Co.
Construction Specialties, Inc.
Metal-Aire Louver Company

2.2 Materials

A. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer to provide required finish.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T52.

C. Fastenings: Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be hot-dip galvanized, stainless steel or aluminum. Provide types, gages and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

E. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

2.3 Fabrication, General

A. Provide louvers and accessories of design, materials, sizes, depth, arrangements, and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage, where applicable (for adjustable units, if any); strength; durability; and uniform appearance.

B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealants in joints between louvers and adjoining work.

C. Include supports, anchorages, and accessories required for complete assembly.

D. Provide vertical mullions of type and at spacings indicated but not further apart than recommended by manufacturer or 72" o.c., whichever is less. At horizontal joints between louver units provide horizontal mullions except where continuous vertical assemblies are indicated.

E. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.

F. Join frame members to one another and to stationary louver blades by welding, except where indicated otherwise or where field bolted connections between frame members are made necessary by size of louvers. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

2.4 Stationary Extruded Aluminum Wall Louvers

A. Horizontal Drainable Blade Louvers: Units designed to collect and drain water to exterior at sill by means of gutters in front edges or blades, and channels in jambs and mullions. Furnish units with extrusions not less than 0.081" thick, of depth, and sizes indicated, complying with following performance requirements.

1. Free Area: Not less than 50% for a 48" x 48" size.

2. Static Pressure Loss: not more than 0.15" of water gage at an airflow of 1050 fpm free area velocity in intake direction.

3. Water Penetration: Not more than 0.052 oz. per sq. ft. of free area at an airflow of 1000 fpm free area velocity.

4. AMCA Certification: Furnish units bearing AMCA Certified Ratings Seal.

2.5 Metal Roof Dormers

Prefinished metal dormer vents to be equal to “French Provincial” as manufactured by Metal - Aire Louver Company, manufactured for roof slope as detailed. Metal dormer to be as follows:

1. Standard construction ..... 2-3/4" louver, prefinished aluminum
2. Frame ..... 2-3/4" x 6" roof flanges at sides
3. Blades .....Approximately 3-1/2" on center
4. Blade Angle ..... 45 degrees
5. Screen ..... Fixed Type, 8" x 16", .009 gauge galvanized
6. Base Length .....As Detailed
7. Height of louver at mid point .....As Detailed
8. Roofing ..... 2" standing seam perpendicular to arch

2.6 Louver Screens

A. Fabricate screen frames of same metal and finish as louver units to which secured, unless otherwise indicated.

Provide frames consisting of U-shaped metal for permanently securing screen mesh.

B. Use Bird Screens where indicated, of the following: 2" sq. mesh. 0.063" aluminum wire.

C. Locate screens on inside face of louvers, unless otherwise indicated. Secure screens to louver frames with machine screws, spaced at each corner and at 12" o.c. between.

2.7 Round Soffit Vents

A. Round soffit vents shall be 6” diameter, heavy gauge prefinished aluminum equal to Model MRDS -Single deflection grille manufactured by Metalaire. Color: White.

2.8 Metal Finishes

A. General: Comply with NAAMM “Metal Finishes Manual” for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are assembled. Protect finishes on exposed surfaces with protective covering, prior to shipment. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.

Provide colors or color matches as indicated or, if not otherwise indicated, as selected by Architect from manufacturer’s standard colors.

B. Aluminum Finishes: Color Anodized Finish: AA-C22A42 (medium matte etched finish with 0.7 mil. min. thick integrally colored anodic coating). Color to match storefront and window finish.

EXECUTION

3.1 Preparation

Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 Installation

A. Locate and place louver units plumb, level and in proper alignment with adjacent work.

B. Use concealed anchorages wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers, as indicated.

D. Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes to where there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations, and refinish entire unit, or provide new units, at Contractor’s option.

E. Protect galvanized and non-ferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry or dissimilar metals.

F. Provide concealed gaskets, flashings, joint fillers, and insulations, and install as work progresses to make installations weathertight.

G. Refer to Division-7 sections for sealants in connection with installations of louvers.

END OF SECTION

1.0 - GENERAL

1.1 Summary

A. Section Includes:
Solid plastic toilet compartments and urinal screens.

B. Related Sections:
Division 01: Administrative, procedural, and temporary work requirements.

1.2 References

A. ASTM International (ASTM)
1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 System Description

A. Compartment Configurations:
1. Toilet partitions: Floor mounted, overhead braced.
2. Urinal screens: Floor mounted.

B. Solid Plastic Panels: Maximum flame spread/smoke developed rating of 75/450, tested to ASTM E84.

1.4 Submittals

A. Submittals for Review:
1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.
3. Samples: 3 x 3 inch samples showing available colors.

1.5 Quality Assurance

A. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.

B. Installer Qualifications: Minimum 5 years' experience in work of this Section.

1.6 Warranties

Provide manufacturer's 25-year warranty against breakage, corrosion, and delamination under normal conditions.

2.0 - PRODUCTS

2.1 Manufacturers

A. Contract Documents are based on products by Scranton Products.

B. Other Manufacturers wishing to submit product, must do so at least 10 days prior to bid and comply with Section 01360 - Product Substitution.

2.2 Materials

A. Doors, Panels and Pilasters:
1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
3. 1 inch thick with edges rounded to 1/4 inch radius.
4. Color: To be selected by Architect from manufacturer's full color range.

B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

C. Stainless Steel: ASTM A167, Type 304.

2.3 Hardware

A. Hinges: Stealth integral hinge from door and pilaster material with exposed metal parts on interior of stall.

B. Door Strike and Keeper:
1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
2. Bumper: Extruded black vinyl.

C. Latch and Housing:
1. Heavy-duty extruded aluminum.
2. Latch housing: Bright dip anodized finish.
3. Slide latch and paddle.

D. Coat Hook/Bumper:
1. Combination type, chrome plated Zamak.
2. Equip outswing handicapped doors with second door pull and door stop.

E. Door Pulls: Chrome plated Zamak.

2.4 Components

A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, with aluminum heat-sinc fastened to bottom edges.

B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.

C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

D. Wall Brackets: 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

3.0 - EXECUTION

3.1 Installation

A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 14 inches above finished floor.

D. Provide uniform, maximum 3/8 inch vertical clearance at doors.

E. Not Acceptable: Evidence of cutting, drilling, or patching.

3.2 Adjusting

Adjust doors and latches to operate correctly.

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work required under this section consists of room & wall signage.

1.2 Existing Conditions

A. It is the general contractor's responsibility to field verify existing signage before a bid and provide signage that shall match all existing signage types and styles currently installed to provide a continuity of design to the owner as required.

1.3 Submittals

A. Submit a sample of signs, including size, lettering style, materials, and finish.

B. Provide mounting templates.

C. Signs shall conform to requirements as set forth by the AMERICANS WITH DISABILITIES ACT Accessibility Guidelines.

D. Submit the schedule indicating each room name and number indicated on Architectural Drawings with a corresponding space for the Owner's markup for the actual room name and number per school system of each room name and number along with sign type to the Architect for review.

2.0 – PRODUCTS

2.1 Manufacturers

Subject to compliance requirements. Provide products by the following.

1. Leeds Architectural Letters, Inc. (Basis Of Design)
2. Devaney Sign Service, LLC
3. Bellco Sign & Engraving Specialists

2.2 Room and Wall Signs Standards

A. Provide photopolymer signs with Grade II Braille 3/4" numerals and 5/8" Letters to comply with ADA (American Disability Act). Signs shall be color selected from the manufacturer's full line of colors.

B. Room signs with message insert to have 1/16" front plate, minimum 1/32" solid spacer (no tape spacer), and 1/8" back plate.

C. Room Signs (no message slot)- minimum 1/8" thick with 1/32" raised letters.

D. Elevator and Stair Signs to be 6 x 6 and 1/8" thick with 1/32" raised letters.

E. Exterior Signs - Exterior Aluminum .040 thick, factory painted, and text to be silkscreened or inkjet print.

F. Edge Condition - Square Cut.

G. Corners - Round.

H. Mounting:
1. Sheet Rock – double-sided tape
2. Block or Brick – double-sided tape and silicone
3. Signs to be mounted with screws and anchors if specified.
4. Signs mounted on the wall adjacent to the latch side of the door 60" from floor to centerline of signs and 2" from the edge of the door frame to edge of the sign.

2.3 Typical Signage Schedule (**refer to Architectural Signage Plan in construction documents, WHERE applicable and indicated on plans)**

A. All Offices, Classrooms, and Instructional Areas shall be 6" x 8" with a 2-1/2" x 8" changeable clear message insert unless otherwise indicated. **Refer to Item 1.2, Item A for existing signage conditions**

B. All other interior door signs except corridor and vestibule doors shall be a 6" x 6" with no message strip.

C. All restrooms shall have a minimum 6" x 8" sign with pictogram area with an additional area for raised copy and Braille.

D. 6" x 6" signs at all elevators on all floors. (Use Stairs in Case of Fire...etc.) **IF applicable.**

E. 6" x 6" Stair Sign at every stair on all floors with pictogram **IF applicable**.

F. 3" x 7" area of refuge sign with raised copy and Braille **IF applicated and indicated on the Life Safety Plans**

G. Provide Framed Signage with Clear View Window. Frame to Match Interior Signage Cover) to accommodate an 8.5 x 11 Landscape Floor Plan. Provide two (2) per Classroom and Assembly Area.

H. 6" x 6" tactile exit sign at all interior exit doors leading directly to the exterior with raised copy and Braille. (Identified as **EXIT** on signage plan)

J. Occupant Load Sign to be provided at every Auditorium, Gymnasium, and Cafeteria (**Assembly Areas**) as required by IBC Section 1004.3

K. Building Dedication Plaque – Refer to Specification section 12150 – Miscellaneous Furnishings & Fixtures

2.4 Storm Shelter Signage (**See Life Safety Plan IF applicable**)
1. Provide the following Storm Shelter Signage as required by ICC 500-2014 and as indicated on the storm shelter plan located within architectural drawings.
2. Provide a 12" x 16" storm shelter plaque which shall be located within each storm shelter, as indicated.
3. Provide 8" x 8" storm shelter sign, location as indicated.
4. Provide 4" x 7" storm shelter instruction signs on each face of all storm doors as indicated.
5. Provide an 8"x8" sign adjacent to all doors leading to electrical equipment rooms containing stationary battery systems indicating "APPLY NO WATER," along with the type of battery system and current maintenance contact information

2.5 Project Sign - Specification requirements are listed in Section 01030.

3.0 - EXECUTION

3.1 Installation of Signs
Install signs on surfaces and at heights as directed.

3.2 Install "Physically Handicapped Parking Only" sign at Handicapped Parking Spaces as indicated.

3.3 Install Traffic Control Signs in accordance with State of Alabama Highway Department Manual on Uniform Traffic Control Devices.

END OF SECTION

1.0 -GENERAL

1.1 Scope

The work required under this section consists of custom engraved Information Plaque(s) to indicate pertinent roofing or re-roofing information on the actual roof site for the Owner's future use.

1.2 Submittals

Submit a full scale graphic representation of the proposed Information Plaque(s) for the Architect's approval.

1.3 Related Sections

A. Division One

B. TPO Roofing System, Section 07420, Asphalt Shingles Section 07310

2.0 - PRODUCTS

2.1 Information Plaque

A. Provide one Information Plaque at each distinguishable area of new roofing being provided under this contract as follows:
   1. Size: 3 ½" x 7" (min.)
   2. Material: 1/8" thick aluminum or stainless steel
   3. Finish: Match roof edge metal
   4. Text: Deep Engraved and painted to contrast
   5. Font: ¼" (min.) Romans
   6. Minimum Information:
      a. Date - Substantial Completion / Start of Warranty
      b. Owner / Architect
      c. General Contractor
      d. Roofing Sub-Contractor
      e. Roof System Manufacturer
      f. Description of roofing system / type
      g. Warranty period / information

3.0 - EXECUTION

3.1 Mounting

A. Provide Information Plaque with 3/32" mounting holes at opposite ends.

B. Permanently attach to building features so as not to cause leaks at each distinguishable field area of new roof work. Preferably at the north or northeast perimeter edge; otherwise consult the Architect.

C. Locate to be visible from atop the roof only and close to new work so as to not mistake the area being identified; 8" minimum above the finish roof surface.

END OF SECTION

SECTION 10505 - METAL SPORT, ATHLETIC LOCKERS
AND STAFF/CORRIDOR LOCKERS

1.0 - GENERAL

1.1 Related Documents

A. General Conditions

B. Division One

1.2 Scope Of Work

A. Description: Furnish and install factory-assembled Heavy-Duty MIG-Welded Metal Lockers, complete, as shown and specified per contract documents.

1.3 Related Work Specified Elsewhere:

A. Concrete: Section 03320

B. Rough Carpentry: Section 06100

C. Finish Carpentry: Section 06210

1.4 Submittals

A. Refer to Section 01350 - Submittals

B. Shop Drawings: Submit drawings showing locker types, sizes, quantities, including all necessary details relating to anchoring, trim installation and relationship to adjacent surfaces.

C. Color Charts: Provide color charts showing manufacturer's available colors. Provide metal samples if requested.

D. Numbering: Locker numbering sequence will be provided by the approving authority and noted on approved shop drawings returned to the locker contractor.

1.5 Quality Assurance

A. Manufacturing Standard: Provide metal lockers that are standard products of a single manufacturer, with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings.

B. Fabricator Qualifications: Firm experience **(minimum 5 years)** in successfully producing the type of metal lockers indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.

C Installer Qualifications: Engage an experienced (minimum 2 years) installer who has successfully completed installation of the type of metal lockers and extent to that indicated for this project.

1.6 Product Handling

A. All work shall be fabricated in ample time so as to not delay construction process.

B. All materials shall be delivered to the site at such a time as required for proper coordination of the work. Materials are to be received in the manufacturer's original, unopened packages and shall bear the manufacturer's label.

C. Store all materials in a dry and well-ventilated place adequately protected from the elements.

1.7 Guarantee

LIFETIME WARRANTY**:** Submit upon completion of the work, warranty covering all defects in materials and workmanship excluding finish, damage resulting from deliberate destruction and vandalism under this section for the lifetime of the facility.

2.0 - PRODUCTS

2.1 Manufacturers

A. Subject to compliance with the design, material, method of fabrication and installation as required in this specification section or modified as shown on drawings. Manufacturers offering products which may be incorporated in the work include the following:
Art Metal Products. (Basis of Design)
List Industries, Inc.
Penco Products, “All Welded”

B. Other Locker manufacturers may submit for preapproval at least 10 days prior to bid. Comply with Section 01360.

2.2 Locker Types

B. Type 2 - **"Champ Athletic Lockers”** as manufactured by Art Metal Products or approved equal.

1. Type 2: Double Tier
   a. Size: 24" wide x 18" deep x 72" high

2. Wardrobe Doors: 14 gauge diamond perforated sheet steel with recessed handle, and multi-point gravity lift-type latching.

3. Box Doors: 14 gauge perforated sheet steel, side hinged with single-point spring bolt latching

4. Sides: Twin-Frame Vertical side panels shall be of integral frame and side wall construction manufactured from solid 16 gauge steel sheet. Sides to be diamond perforated for added ventilation.

5. Tops, Bottoms, Shelves: 16 gauge solid sheet steel

6. Backs: 18 gauge solid sheet steel

2.3 Locker Room Seating

A. Benches:

1. Provide standard locker benches with pedestal as indicated on drawings. Length as indicated on drawing.

2.4 Fabrication

A. Materials:

1. Steel Sheet: All sheet steel used in fabrication shall be prime grade free from scale and imperfections and capable of taking a heavy coat of custom blend powder coat.

2 Fasteners: Cadmium, zinc or nickel plated steel; bolt heads, slotless type; self locking nuts or lock washers.

3. Hardware: Hooks and hang rods of cadmium plated or zinc plated steel or cast aluminum. Coat Rods of stainless steel tube.

4. Handle: Zinc plated, cold rolled finger pull - Type 1
Handle: Seamless drawn 304 stainless steel recessed handle - Type 2 and Type 3

5. Number Plates: To be aluminum with not less that 3/8" high etched numbers attached to door with two aluminum rivets.

2.5 Construction

All lockers shall be factory-assembled, of all **MIG** welded construction, in multiple column units to meet job conditions**. Assembly of locker bodies by means of bolts, screws, or rivets will not be permitted. Welding of knockdown locker construction is not acceptable.** Grind exposed welds and metal edges flush and make safe to touch.

Unibody/Vertical Side Panels: Shall be of integral frame and side wall construction manufactured from solid 16 gauge sheet steel. The one-piece side/frame shall be formed to provide a continuous door strike on the hinge side. An additional continuous vertical door strike shall be achieved at the latch side by MIG welding a 16 gauge full height channel frame member to the integral locker side producing a rigid torque-free welded locker body. The frame shall include a tab which engages a slot in the base locking the side panel and frame into position. Sides to be diamond perforated.

Locker Base: 4” Concrete Curb by others.

Flat Tops: Shall be formed of one piece of 16 gauge cold rolled sheet steel and shall be an integral part MIG welded to each vertical side panel frame member and be continuous to cover the full width of a multiple framed locker unit.

Hat Shelves, Intermediate Shelves and Bottoms: - Shall be 16 gauge sheet steel, have double bends at front and shall be MIG welded to the sides.

Backs: Shall be 18 gauge cold rolled sheet steel, be continuous to cover a multiple unibody and welded to each vertical side panel.

2.6 Locker Accessories/Equipment: Type 1

A. Provide Padlock Hasp -Locks by Owner.

B. Equipment: Furnish each locker with one hat shelf, two single prong hooks at back of underside of shelf and one 1” O.D. stainless steel tube coat rod factory attached below upper hat shelf.

C. Finished End Panels (at exposed ends required): Shall be "Boxed" type formed from 16 gauge cold rolled steel with 1" O.D. double bends on sides and a single bend at top and bottom with no exposed holes or bolts. Finish to match lockers. **Provide Boxed Ends at all exposed ends.**

D. Flat Tops and Flat Top fillers: As Required

D. Fillers: (required) Provide where indicated, of not less than 16 gauge sheet steel, factory fabricated and finished to match lockers. **Provide Solid Ends at all corner and filler conditions.**

2.6 Locker Accessories:/Equipment: Type 2/ Type 3/ Type 4/Type 5

A. Provide Padlock Hasp -Locks by Owner.

B. Equipment: Furnish each locker with the following items, unless otherwise shown.

Double tier lockers: Openings 30” thru 36” high shall include one double prong ceiling hook and a minimum of two single prong wall hooks.

C. Finished End Panels (If required): Shall be "Boxed" type formed from 16 gauge cold rolled steel with 1" O.D. double bends on sides and a single bend at top and bottom with no exposed holes or bolts. If lockers have slope tops, end panels must be formed with slope at top to cover the ends of the slope tops. Finish to match lockers. **Provide Boxed Ends at all exposed ends.**

D. Fillers (if required): Provide where indicated, of not less than 16 gauge sheet steel, factory fabricated and finished to match lockers. **Provide Solid Ends at all corner and filler conditions.**

2.7 Finishing: All locker parts to be cleaned and coated after fabrication with a seven stage hot-spray washing process and coated with zirconium-based nanotechnology providing a green alternative to traditional iron phosphate followed by a coat of high grade custom blend powder electrostatically sprayed and baked at 350 degrees Fahrenheit for a minimum of 20 minutes to provide a tough durable finish. Color to be selected from manufacturer’s standard list of colors. **Two-Tone Color Combination: Shall be no additional cost with the locker body, frame and trim chosen from one color and the doors may be one of any other color chosen from manufacturers standard selection.**

3.0 - EXECUTION

3.1 Installation

A. General: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.

B. Placement: Lockers shall be set in place, plumb, level, rigid, flush and securely attached to the wall (or bolted together if back-to-back) and anchored to the floor or base according to manufacturer's specifications.

C. Anchorage: About 48" o.c., unless otherwise recommended by manufacturer, and apply where necessary to avoid metal distortion, using concealed fasteners. Friction cups are not acceptable.

D. Trim: Sloping tops, metal fillers and end panels shall be installed using concealed fasteners. Provide flush, hairline joints against adjacent surfaces.

3.2 Adjustment

Upon completion of installation, inspect lockers and adjust as necessary for proper door operation. Touch-up scratches and abrasions to match original finish.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work of this section shall include all labor, material, and equipment necessary to furnish and install Walkway Cover and accessories hereafter specified and/or indicated on the Drawings.

1.2 Manufacturer
Walkway Cover shall be Tennessee Valley Metals, Peachtree Protective Covers, Inc., Superior Metals, Mitchell Metals or approved equal as long as they meet or exceed specifications and adhere to drawing details.

1.3 Shop Drawings
Shop drawings shall be generated under the services of a structural engineer licensed in the State of Alabama, sealed and signed and submitted to the architect for approval before fabrication. These drawings to show: size, arrangement, foundation and type of material, connections and relationship to adjacent work and compliance with applicable codes.

1.4 Guarantee
The Walkway Cover Contractor shall guarantee all materials and workmanship covered by this section for a period of one (1) year from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.

2.0 - PRODUCTS

2.1 General
A. Structural roof system for walkway shall be complete with all required components and accessories as shown on the Drawings and as required.

B. The system shall be designed to structurally withstand severe icing, heavy hail, and 110 mph wind loads. Minimal structural capacity for all components shall meet the latest edition of the IBC as adopted by the Authority having jurisdiction.

2.2 Concealed Drainage
Water shall drain internally from deck to beams and/or to columns, spouting out at ground level through columns.

2.3 Materials
A. Roof Panel: The self-supporting aluminum Roof Panel shall be an alloy accurately roll formed to the deep channel design shown on the Drawing. It shall have a depth required for span and be furnished with an interlocking design to provide a weathertight load-bearing deck. The gauge of the panels shall be as required to support the load in accordance with engineering prints and calculations provided by the manufacturer. Material to be baked enamel acrylic. Color as selected by Architect.

B. Roll-formed Fascia: The fascia shall be accurately roll formed from an aluminum alloy to the sculptured design shown on the drawing so that it will serve as a built-in gutter for roof drainage and as a structural frame member with a height of not less than 6-1/4" and a gutter width of not less than 2-3/8".

Gutter cross sectional area shall be 4 square inches. Fascia gauge shall be as required for the load to be supported in accordance with engineering prints and calculations provided by the manufacturer. Materials to be baked enamel acrylic. Color as selected by Architect.

C. Finish: The enameled finish on roof panels, roll-formed fascia and related enameled components shall be designed for optimum performance in exterior installations under all environmental conditions. The finish shall be applied in accordance with and conform to, or exceed the Painted Sheet "Quality Standards" and recommended ASTM, Military and/or Federal Test Methods specified by the Aluminum Association in their publication "Aluminum Standards & Data".

All exposed materials shall be pre-finished. Color choices shall include industry standard bronze, dark bronze, medium bronze, white, cream, etc.

Galvanized metal shall be solvent clean with VM&P Naphtha.
Primer: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310

Finish: Apply two coats
S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

Non-primed metal shall be cleaned and etched with approved acid and washed with water.
Primer: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310

Finish: Apply two coats
S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

Primed metals shall be inspected, scuffs, and abrasions sanded free of rust and receive full coat of primer. Concealed metal surfaces shall be spot primed.

Spot Primer Coat – S-W Pro Industrial Pro-Cryl Universal Primer, B66-310
Finish: Apply two coats
S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

D. Component Accessories: Roof Brackets, Post Brackets, Flashing, etc., shall be of same materials and finishes as specified for prime components. Each part and its use is described in the engineering prints and calculations provided by the manufacturer. Each part shall be used as specified in the aforementioned prints. Posts shall be used as specified. All components must match finish color as selected by Architect.

E. Hardware: All bolts, nuts, washers, and screws used in joining the members of the canopy together shall be stainless steel up to 1/4" diameter nominal size. Any hardware 1/4" diameter and larger shall be hot dip galvanized to withstand 200 hours' salt spray test of maximum resistance to rust and corrosion. Provide concealed fasteners where possible. All hardware must match finish color as selected by Architect.

F. Flush soffit panels are required.

3.0 - EXECUTION

3.1 Installation

A. Installed units shall have the following minimum pitch for water drainage of the roof.
Minimum pitch for all panels and fascia:
Up to 10'-1/8" ft.
Over 10'-1/4" ft.

B. Installed unit shall be properly caulked with a suitable, high quality material where needed and where specified.

C. Installed unit shall meet local building code requirements and conform to the engineering prints provided by the manufacturer.

3.2 Erection

A. Columns and beams shall be aligned with care before columns are grouted. Downspout columns shall be filled to the discharge level to prevent standing water, and downspout deflectors installed after grouting.

B. Grout shall be #2000 compressive strength. Mix by volume, 1 part Portland cement and 3 parts masonry sand. Add water to make pouring consistency and vibrate with a small rod to fill voids.

C. Extreme care shall be taken to prevent damage or scratching. All workmanship must be of the very best, with neat miters and fitted joints.

3.3 Flashing

At adjoining construction, as indicated or required.

3.4 Clean Up

Remove all debris from the site as it accumulates. Clean Protective Walkway Cover at completion of installation and leave in as new condition.

END OF SECTION

PART 1 - GENERAL

1.1 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to work specified in this section.

1.2 General Description of Work

A. Work in this section shall include design, fabrication and installation of a complete rod supported extruded aluminum canopy system in accordance with the drawings and this specification.

1.3 References

A. Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.

B. ASCE 7, Minimum Design Loads for Buildings and Other Structures.

C. American Architectural Manufacturers Association (AAMA)

D. American Society for Testing and Materials (ASTM)

1.4 Related Sections

A. Concrete Work - Section 03300

B. Masonry Work - Section 04200

C. Miscellaneous Metals - Section 05500

D. Flashing and Sheet Metal - Section 07600

E. Sealants - Section 07900

1.5 Submittals

A. Product Data: Submit manufacturer’s product information, specifications and installation instructions for components and accessories.

B. Shop Drawings: Submit complete erection drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and optional installation details to clearly indicate proper assembly of components, sealed by a State Registered Structural Engineer registered in the state in which the work is being performed.

C. Calculations: Submit complete structural design calculation sealed by State Registered Structural Engineer registered in the state in which the work is being performed.

D. Design and engineering of attachment surfaces are not covered in this specification and scope of work.

1.6 Quality Assurance

A. Codes and standards: Comply with provisions of the following except as otherwise indicated: 2021 International Building Code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.

B. Manufacturer: Obtain aluminum covered walkway system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.

C. Installer Qualifications: Firm with not less than three (3) years experience in installation of aluminum walkway covers of type, quantity and installation methods similar to work of this section.

D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work.

E. Coordination: Coordinate work of this section with work of other sections which interface with covered walkway system (sidewalk, curbs, building fascias, etc.).

1.7 Warranty

A. Provide manufactures standard one-year warranty that shall include, but not limited to, coverage for structural, water tightness and finish beginning the day of Substantial Completion of Installation.

PART 2 - PRODUCT

2.1 Manufacturers

Canopy shall be Tennessee Valley Metals, Peachtree Protective Covers, Inc., Superior Metals, Mitchell Metals or approved equal as long as they meet or exceed Specifications and adhere to drawing details.

2.2 Materials

A. Aluminum Extrusions: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.

B. Finishes: For factory baked enamel finish, specify AAMA 603.8 standard or custom color.

For fluoropolymer (Kynar) finish, AAMA 605.2, two or three coats.

For satin anodized finish, specify 204.R1 meeting Aluminum Association specification AA-M-10C- 22A21.

2.3 Components

A. Support rods: Rods shall be 2” tubular shapes as per manufacturer’s standard. (Rod and clevis is available as an option.)

B. Deck: Deck shall be extruded self-flashing sections interlocking into a composite unit.

C. Fascia: Fascia shall be manufacturer's standard shape. Size as indicated on drawings.

D. Flashing: Flashing shall be .032” aluminum (min.). All thru-wall flashing is completed by others.

E. Scuppers: Scupper plates shall be used to drain water from the canopy fascia. (Downspouts are available as an option).

F. Fasteners: All exposed fasteners shall be stainless steel.

G. Flush soffit panels are required.

2.4 Fabrication

A. Drainage: Water shall drain directly from the fascia and be diverted by a scupper plate (or into downspout and discharged at ground level).

B. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self- flashing manner.

PART 3 - EXECUTION

3.1 Preparation

A. Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.2 Installation

Protective cover shall be erected true to line with adequate slope for drainage. Adequate framing members and/or blocking shall be provided in the wall structure (by others) to safely support the canopy.

3.3 Cleaning

A. All protective cover components shall be cleaned promptly after installation.

3.4 Protection

A. Extreme care shall be taken to protect materials during and after installation

END OF SECTION

1.0 - GENERAL

1.1 Section Includes

A. Stand-alone roof equipment screens and supporting steel framework. Screens shall be designed to attach to the roof structure and not the equipment being screened.

B. Roof screen accessories.

1.2 Related Sections

A. Section 03300 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.
B. Section 04210 - Masonry Anchorage and Reinforcement: Installation of anchors.
C. Section 05120 - Structural Steel: Metal Framing.
D. Section 05310 - Steel Floor Deck.
E. Section 05500 - Metal Fabrications: Frames and supports.
F. Section 09910 - Paints and Coatings: Field applied paint finish.
G. Division 15 - Roof Top HVAC Equipment.

1.3 References

A. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
C. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
D. ASTM A 1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
E. ASTM B 749 - Standard Specification for Lead and. Lead Alloy Strip, Sheet, and Plate Products.
F. ASTM D 4811 - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing.
G. ASTM D 6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
H. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
J. AWS D1.1 - Structural Welding Code - Steel.
K. AWS D1.6 - Structural Welding Code - Stainless Steel.

1.4 Coordination

A. Coordinate Work with other operations and installation of roofing materials to avoid damage to installed insulation and membrane materials.

1.5 Action Submittals

A. Submit under provisions of Section 013300.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Layout and erection drawings showing typical cross sections and dimensioned locations of all frames and base supports. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, shape, and patterns.

1.6 Informational Submittals
A. Design Calculations: 3 copies of structural design calculations for structural components and components resisting wind loads with seal and signature of professional engineer licensed in the State of Alabama.
B. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.
D. Warranties: 3 signed copies.

1.7 Quality Assurance
A. Manufacturer Qualifications: Manufacturer with a minimum five years documented experience in producing pre-manufactured metal-framed equipment screens.
B. Design Qualifications: Provide structural design calculations stamped by a professional engineer licensed in the state in which this project is located.
C. Welders: AWS certified within previous 12 months.
D. Pre-Installation Meeting:
1. Convene at job site, at least seven calendar days prior to scheduled beginning of construction activities of this section, to review requirements of this section.
2. Require attendance by representatives of the installing subcontractor (who will represent the system manufacturer), the mechanical subcontractors and other entities affected by construction activities of this section.
3. Notify Architect four calendar days in advance of scheduled meeting date.
E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Locate in area designated by Architect.
2. Construct mock-up, one full screen section wide, including two roof supports.
3. Do not proceed with remaining work until workmanship, color, and location is approved by Architect.
4. Remove mock-up if required by Architect.
5. Accepted mock-up may remain in place.

1.8 Delivery, Storage, And Handling
A. Deliver materials to the project site clearly marked for proper identification.
B. Receive, handle and store materials in conformance with the manufacturers printed instructions.
C. Store products under cover, in manufacturer's unopened packaging until ready for installation.
D. Protect materials from exposure to moisture.
E. Store materials in a dry, warm, ventilated weathertight location.
F. Protect metal fabrications from damage by exposure to weather.

G. Handling: Use a forklift or crane to move material. Do not lift the bundles by the metal bands.
   1. Fork Lift: Spread the forks as far as possible to balance the load. Drive slowly when moving long bundles over uneven surfaces to avoid tipping the load
   2. Crane: Position the canvas sling straps so that the space between the straps is at least 1/3 the length of the bundle. Use sling straps with looped ends running one end of the strap through the loop at the other end to cinch the bundle when lifted. When setting the load on the roof, put wood blocks under it to protect the roof and allow space to remove the sling straps.
   3. Roof Placement: Spread the bundles and crates out as much as possible to avoid overloading the roof structure. Place the material directly over major supports such as beams or trusses.
   4. Position bundles of tubing parallel to the slope of the roof and block prior to opening to prevent the tubing from rolling down the roof slope when unbundled.

1.9 Project Conditions
A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
B. Field Measurements: Verify roof screen dimensions and conditions of the installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating equipment enclosure without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 Warranty
A. Framing System: Provide manufacturer's standard written limited warranty stating that the complete framing system shall be warranted against structural failure due to cracking, buckling, bending, tearing or corrosion arising under normal use and environmental conditions for the coverage period applicable.
   1. Products installed on projects located 2 miles or greater from salt or brackish bodies of water shall be warranted for twenty (20) years
   2. Products installed on projects located greater than 1 mile but less than 2 miles from salt or brackish bodies of water will be warranted for five (5) years, except for aluminum, stainless steel or copper Products which will be warranted for twenty (20) years.
   3. Products installed on projects located 1 mile or less from salt or brackish bodies of water will be warranted for three (3) years, except for aluminum, stainless steel or copper Products which will be warranted for twenty (20) years
B. Panel Finish:
   1. Provide written warranty stating that the paint finish applied on all equipment enclosure panels will be warranted against chipping, peeling, cracking, fading, or blistering for the coverage period of twenty (20) years.
   2. Provide warranty signed by the panel manufacturer and paint finish applicator (if separate from manufacturer).

C. Louvers: Refer to Section 08910, Louvers

D. The above warranties are in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

2.0 - PRODUCTS

2.1 Performance Requirements

A. Design Loads: Comply with Building Code for site location and building height.
   1. Design to resist ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
   2. Design all materials, assembly and attachments to resist snow, wind, suction and uplift loading at any point without damage or permanent set.

B. Structural Design: Prepare structural design calculations for screen framing and attachment to structure including reactions at base supports for verification of roof structure by Architect.

C. All welds to be performed by an AWS certified welder. Valid certification to be provided.

2.2 Manufacturers

A. Acceptable Manufacturer: Roof Screen Mfg., which is the Basis of Design.

B. Comparable products may be pre-approved. See Section 01360 - Product Substitutions. Requests for substitutions will be considered in accordance with provisions of Section 01360. Submit 10 days prior to bid. Approval shall be in writing via Addendum.

2.3 Materials

A. Square Base Supports: Weldments fabricated from cold rolled steel conforming to ASTM A 1008, fabricated with pre-punched holes in base plate for fastening to roof structure. After fabrication, apply minimum 2 to 4 mil baked on powder coat primer.
   1. Height 5 inches (127 mm).
   2. Height 9 inches (229 mm).
   3. Height 12 inches (305 mm).

B. Square Base Support Extensions: Fabricated from same material and finish as base supports.
   1. Height 3 inches (76 mm).
   2. Height 4 inches (101 mm).

C. Square Base Cap: Weldments fabricated from AISI Type 304 stainless steel with mill finish, and fabricated to overlap base support and flashing boot a minimum of 2 inches (51 mm). Provide moment resisting adjustable connection to attach framing to base cap.

D. Round Post Supports: 12 inch (305 mm) tall weldments fabricated from galvanized steel tube conforming to ASTM A 500 and cold rolled steel plate conforming to ASTM A36, fabricated with pre-punched holes in base plate for fastening to roof structure. After fabrication, apply minimum 2 to 4 mil shop primer to base plate and weld. Provide height adjustment with galvanized tube sleeve conforming to ASTM A 500, sized to telescope over outside of round post

tube and fastened at desired height with self-drilling, self-tapping screws.

E. Round Post Cap: Weldments fabricated from AISI Type 304 stainless steel with mill finish fabricated to slip over 2-1/2" sleeve tube allowing adjustable height when used with Round Post Support.

F. Square Galvanized Roof Flashing: Fabricated from galvanized sheet steel, 24 gauge, conforming to ASTM A 653/A 653M. Provide with [galvanized sheet steel, 24 gauge (ASTM A 653/A 653M)] [lead, 4 psf (ASTM B 749)] base flange that extends a minimum of 4 inches (102 mm) onto the roof surface on all four sides. Riser shall be tapered to allow easy fit over Square Base Supports with minimal gap at top of flashing. Solder all seams for water tightness.

G. Square Copper Roof Flashing: Fabricated from cold rolled copper sheet, 16 oz per sq ft, conforming to ASTM B 370. Provide with [copper sheet (ASTM B 370), 16 oz per sq ft] [lead, 4 psf (ASTM B 749)] base flange that extends a minimum of 4 inches (102 mm) onto the roof surface on all four sides. Riser shall be tapered to allow easy fit over Square Base Supports with minimal gap at top of flashing. Solder all seams for water tightness.

H. Square TPO Roof Flashing: Fabricated from 60 mil, white, single ply TPO sheet conforming to ASTM D 6878. Provide with base flange that extends a minimum of 5 inches (127 mm) onto the roof surface on all four sides. Riser shall be tapered to allow easy fit over Square Base Supports with minimal gap at top of flashing. Hot weld all seams for water tightness.

I. Square PVC Roof Flashing: Fabricated from 60 mil, white, single ply PVC sheet conforming to ASTM D 4434. Provide with base flange that extends a minimum of 5 inches (127 mm) onto the roof surface on all four sides. Riser shall be tapered to allow easy fit over Square Base Supports with minimal gap at top of flashing. Hot weld all seams for water tightness.

J. Round Lead Roof Flashing: Fabricated from sheet lead, 4 psf, conforming to ASTM B 749. Provide with base flange that extends a minimum of 5 inches (127 mm) onto the roof surface on all four sides. Solder all seams for water tightness.

K. Round TPO Roof Flashing: Fabricated from 60 mil, white, single ply TPO sheet conforming to ASTM D 6878. Provide with base flange that extends a minimum of 5 inches (127 mm) onto the roof surface on all four sides. Hot weld all seams for water tightness.

L. Round PVC Roof Flashing: Fabricated from 60 mil, white, single ply PVC sheet conforming to ASTM D 4434. Provide with base flange that extends a minimum of 5 inches (127 mm) onto the roof surface on all four sides. Hot weld all seams for water tightness.

M. Roof Flashing: Refer to Division 07 section that specifies the roof membrane.

N. Base Cap Gasket: EPDM with self-adhesive closed cell foam.

O. Framing: Carbon steel structural tubing in manufacturer’s standard sizes, conforming to ASTM A 500 with manufacturer’s standard galvanized coating conforming to ASTM B 117 salt spray testing. Provide with wall thickness as determined by structural calculations.

P. Connector Fittings: Fabricated from AISI Type 304 stainless steel with mill finish.

Q. Steel Z section: Steel sheet conforming to ASTM A 653, Class SS, with a G90 hot-dip galvanized coating.

R. Steel Hat Channel: Steel sheet conforming to ASTM A 653, Class SS, with a G90 hot-dip galvanized coating.

S. Hardware: Bolts, nuts, washers and screws 18-8 stainless steel.

T. Welding Materials: AWS D1.1; type required for materials being welded.

U. Panel:

1. Profile:
   a. 7.2 Rib Panel.
   b. 3 inch Deep Rib Panel.
   c. Flush Panel.
   d. R Panel.
   e. U Panel.
   f. 7/8 inch (22 mm) Corrugated.
   g. Flush Textured Panel.
2. Base Metal:
   i. Minimum 26 gauge Galvalume steel sheet, AZ50, conforming to ASTM A 792 for painted and unpainted panels.
   j. Minimum 24 gauge Galvalume steel sheet, AZ50, conforming to ASTM A 792 for painted and unpainted panels.
3. Finish:
   l. PVDF fluoropolymer, 1 mil, 2 coat, 70 percent.
   m. Siliconized polyester thermoset coating, 0.90 mil minimum dry film thickness.
   n. Color as selected by Architect from manufacturer's standard color range, 20 colors minimum.
   o. Coat reverse side with off-white primer coat.
4. Panel Fasteners: No. 14 self-tapping sheet metal screw. Color coat heads to match panel color.
5. Panel Trim: Same material and finish as panel. Configuration as shown on Drawings

2.4 Fabrication

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Fabricate system components so that portions of screen can be dismantled for repairs to equipment being screened and for future roof replacement.

F. Trim and Closures: Fabricated from 24 gauge metal and finished with the manufacturer’s standard coating system.

3.0 - EXECUTION

3.1 Examination

A. Examine area where work will be installed to verify the installation can be performed in accordance with the Drawings and structural calculation requirements without interference from other equipment or trades.

B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Do not begin installation until conditions have been properly prepared.

3.2 Preparation

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 Installation

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain indicated alignment until completion of erection and installation of permanent attachments.

D. Anchor fabrications to structure as indicated.

E. Separate dissimilar metals and use gasketed fasteners, isolation shim, or isolation tape to eliminate possibility of corrosive or electrolytic action between metals.

F. Exercise care when installing components so as not to damage finish surfaces. Touch up as required to repair damaged finishes.

G. Install flashing boots at base supports as required to provide a watertight connection. Install as recommended by the roof membrane manufacturer.

H. Remove all protective masking from material immediately after installation.

3.4 Cleaning And Protection

A. Remove all protective masking from framing and trim material immediately after installation. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer’s written installation instructions. Maintain in a clean condition during construction.

B. Protect installed products until completion of project.
   1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
   2. If minor damage to finishes occurs, repair damage in accordance with manufacturer’s recommendations; provide replacement components if repaired finishes are unacceptable to Architect.

C. Prior to Substantial Completion: Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.

D. Replace metal wall panels and framing members that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work under this section consists of all toilet accessories.

1.2 Samples
Returnable samples to be furnished upon request.

1.3 Manufacturer
Catalog numbers indicated in the schedule are from Bobrick Company catalog unless indicated otherwise. Equivalent products as manufactured by American Specialties, Inc., or Bradley, will be acceptable.

2.0 - PRODUCTS

2.1 List of Fixtures

A. The following list of accessories is essentially complete; however, the contractor shall examine the drawings carefully and shall supply such items not specifically called for to provide a complete installation.

B. Fixtures shall be supplied as follows:

1. Feminine Napkin Disposal - Model B-270, surface mounted, stainless steel finish. One per toilet compartment. (Female Only) Provide at all Unisex Toilet locations.

2. Framed Mirror - Model B-165-1830, surface mounted, stainless steel finish. One per lavatory where noted. Custom mirrors are specified under Section 08810 - Glass and Glazing.

3. Grab Bars - Model B6806 (or 6861 at Shower Stall as indicated), 1-1/2" diameter, surface mounted with B-2571 anchors at masonry walls, stainless steel finish. Provide per ADA requirements at Handicapped Toilet Compartment and Shower Stall.

4. Semi-Recessed Waste Receptacle - Model B-3644, stainless steel, key lock assembly with standard vinyl liner no. 3944-12. One per Toilet Room.

5. Mop and Broom Holder - Model B-223 x 36" surface mount, stainless steel, Type 302 (18-8) satin finish. Holders spring loaded, rubber cam with plated steel retainer. Mounting height 6'-0" floor to top. One per service and/or mop sinks.

6. Coat hook with bumper - Model B-212, surface mount aluminum casting with satin finish to match stainless steel. Bumper is hard rubber secured with drive screw. Note: provide one (1) in toilet rooms without stalls.

7. Shower Curtain and Rod - Model B-6047 x width required. Extra heavy-duty stainless steel, Type 304, 18 gauge, 1-1/4" diameter. Vinyl shower curtain: Model # 204-2, white, with Hooks: Model 204-1. One each per shower compartment.

8. Folding Shower Seat – Model B-5181, Stainless Steel with 1/2” phenolic seat as indicated on drawings.

9. **Baby** Changing Station **(TODDLER)** – Model KB200-01 Koala Kare Products; Wall Mounted Horizontally per manufacturer's recommended mounting height and per ADA requirements.

2.2 Finishes

A. All fixtures specified or cataloged to be stainless steel shall be type 302 (18-8) with satin finish.

B. All fixtures specified or cataloged to be chrome finish shall be triple plated with heavy chrome over nickel and copper.

C. Mirrors shall be 1/4" electro-copper backed plate glass.

3.0 - EXECUTION

3.1 Attachment

A. All fixtures shall be secured to walls or partitions in the most secure method possible. Fixtures mounted singly against concrete block shall be secured with toggle bolts.

B. The proper mounting accessories shall be furnished with each item.

C. Contractor shall verify with Architect, the mounting locations and heights before installing accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work under this section consists of First Aid Kit and accessories as indicated to provide for a storm shelter facility.

First Aid Cabinets

Metal Cabinet with door and of sufficient size to handle contents and accessories for mounting. Clearly label cabinet.

1.2 Color shall be any of manufacturers standard as indicated or as selected by Architect. Paint to be high gloss finish.

1.3 Submittals

Submit for approval completely detailed shop drawings including dimensions, construction details, materials, finish and details of adjacent construction.

1.4 Manufacturer

The specifications and drawings are based on products of The American Red Cross to illustrate the standard of quality. Other Manufacturers may submit for pre-bid approval by the architect prior to bid in accordance with Specification Section 01360.

2.0 - PRODUCTS

2.1 Provide First Aid Kits for 1,801 Person Minimum ICC500 Approved

Contents to include but not be limited to:

Adhesive fabric bandages, 1" x 3"
Adhesive plastic bandages, 3/4" x 3"
Knuckle fabric bandages
Fingertip fabric bandages
Triangular sling/bandage, 40" x 40" x 56"
Gauze dressing pads, 3" x 3"
Conforming gauze roll, 2"
Conforming gauze roll, 3"
Trauma pad, 5" x 9"
Antiseptic cleansing wipes (sting free)
First aid burn cream pack, 0.9g each
First aid tape roll, 1/2" x 10" yds
Scissors,
Stainless steel tweezers,
Latex-free exam-quality vinyl gloves,
American Red Cross Emergency First Aid Guides

Quantities shall be in accordance with ICC500 requirements.

3.0 - EXECUTION

3.1 Installation

A. Installation shall be made in accordance with approved shop drawings and manufacturer's instructions.

B. Erect in a rigid substantial manner, straight, and plumb, with all horizontal lines level.

C. All evidence of drilling, cutting and fitting to room finish shall be concealed in the finish work.

3.2 Final Clean-up and Adjusting

A. Hardware shall be adjusted and left in good working order.

B. After all other work in the area, including painting, is complete, exposed surfaces, hardware, fittings and accessories shall be cleaned.

C. Any surfaces which have become damaged and cannot be touched up to match and give adequate protection will be rejected.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured carbon steel bollards of the following types:
   a. Fixed. (TIB-67-SA)

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM F2656 - Standard Test Method for Crash Testing of Vehicle Security Barriers.
   2. ASTM F3016 - Standard Test Method for Surrogate Testing of Vehicle Impact Protective Devices at Low Speeds.

B. European Standard EN124 - Specification for Manhole Covers, Road Gully Gratings and Frames for Drainage Purposes.

C. Manual on Uniform Traffic Control Devices (MUTCD).

D. Military Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA).

1.3 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data:
   1. Manufacturer's data sheets on each product to be used.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Typical installation methods.
   5. Operation and Maintenance Manuals.

C. Verification Samples: Two representative units of each type, size, pattern, and color.

D. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.5 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 WARRANTY

A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: White Cap Systems, Birmingham Alabama, Model # 104BAL60

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 CRASH RATED BOLLARDS

A. Performance Requirements:
1. Protective Bollards shall be steel pipe with prefabricated stock cap, 6” diameter, 6’ steel painted pipe bollards filled with concrete set 2’-6” deep in **1’-4” x 1’-4” square** concrete footing. Bollards shall be placed 3’-6” high above ground and located around the perimeter as indicated by the Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly constructed and prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
   1. Testing and Commissioning Completion: Prior to turnover.
   2. Field test each control panel button, traffic light, safety loop, safety light, and other features. Complete Formal Testing and Commissioning with customer in field, where barrier system and operations are signed off as "APPROVED" prior to turnover.

B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturer’s recommendations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11400 – FOOD SERVICE EQUIPMENT

SPECIFICATIONS NOVEMBER 3, 2025

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 BASIS OF DESIGN AND SPECIFICATION STANDARDS

A. The model number and product specifications of the named primary manufacturer, where more than one manufacturer is listed, was used for the basis of design and specification standards for this project with respect to quality, performance, capacities, physical characteristics, appearance, aspect and function.

B. All manufacturers listed for an item are subject to CDS's approval as a manufacturer for that item; however, the specifications of the primary manufacturer whose product is listed, as the basis of design and specification standards, with a model number and/or description will set the standard for that item. Other manufacturers may modify their product(s) if necessary to comply with the standards set forth herein.

C. Any Bidders who wish to use products by the alternate manufacturers must provide submittals to CDS, before bid, as set forth herein, for review of conformity and determination thereof.

1.3 APPROVED FABRICATORS

A. Custom fabricated equipment shall be constructed in strict accordance with the contract documents. Recommended fabricators for projects in the U.S.:

1. Atlanta Custom Fabricators
   4381 Industrial Access Road
   Douglasville, Georgia. 30134
   770-942-8013

2 LTI. Inc
   1947 Bill Casey Parkway
   Jonesboro, Georgia 30236
   888--584-2722

B. All equipment items containing electrical and/or refrigeration components must be manufactured by a fabricator that can UL list and/or certify their own products (or other listings and/or certifications required by the local Authority Having Jurisdiction [AHJ]). All fabricated equipment must be manufactured by a fabricator that can NSF list and/or certify their products.

1.5 PRE-APPROVED KITCHEN EQUIPMENT CONTRACTORS

1. Birmingham Restaurant Supply.
2. Singer H & R Restaurant Supply
3. Mobile Fixture Company

1. The pre-approved Kitchen Equipment Contractors shall be as listed above.
2. KEC's who wish to tender a formal proposal for this project, shall furnish a letter of request with company history, references and resumes in proper time as per Architects General Guide lines.

1.6 DEFINITIONS

A. The following definitions are intended to clarify the relationships involved in this document and are used as a definition throughout this food service specification.

B. Kitchen Equipment Contractor (K.E.C.) - The K.E.C. is the party responsible for the supplying, delivering (including freight, staging and local warehousing as required), assembling, setting in place, installing, cleaning, sanitizing and/or the polishing of any foodservice item(s) included in this contract, but not limited to all required materials and labor, pursuant to the guidelines and time lines scheduled and/or rescheduled by the Owner, Architect's Food Service Facility Designer/Consultant.

C. Sub-Contractors - The K.E.C. may contract Sub-Contractors to perform any portion of the contract, but the final responsibility for the proper performance of the contract rest solely with the K.E.C.

D. General Contractor (G.C) - The G.C. or Construction Manager (C.M.) has the responsibility for overall installation, scheduling, deliveries, coordination of various trades, rough-in and connection of utilities, including but not limited to all labor and materials for said rough-ins and connections for all equipment in this contract unless otherwise specified, by item, within the equipment data specification sections of this contract. The K.E.C. must coordinate his/her activities and needs with the G.C. / C.M. in a timely manner as not to delay the project.

E. Food Service Facility Designer / Consultant – Culinary-Design Support, Incorporated, (CDS) is the food service designer for this project.

F. The K.E.C. is the party responsible for all taxes, tariffs, duties and/or custom fees and permits where applicable, as may be required. The K.E.C. is contracted by the General Contractor.

G. N.I.F.C. - Whenever the abbreviation N.I.C. is used in this contract, it shall mean the item or items are not part of the Food Service Equipment Contract.

H. The assignments and/or responsibilities as outlined in this section are subject to change at the Owner's discretion.

1.7 RELATED DOCUMENTS

A. All drawings, general, special, and/or supplementary conditions, Division 1, specifications and related documents apply to this specification. The Foodservice Consultant for this project is CDS. The consultant is responsible to the Project Architect and the Owner to ascertain that the K.E.C. complies with all the requirements of this section.

1.8 INTERPRETATIONS

1.8.1 PLANS AND SPECIFICATIONS

A. Should it appear that the work intended to be described or any of the matters relative thereto are not sufficiently detailed or explained on the drawings or in the specifications, the Contractors shall apply to CDS Food Service Design Facility Consultant / Architect for such drawings or explanations as may be necessary and shall conform to them as far as they shall be consistent with original drawings.

B. If any question arises regarding the true meaning of the drawings, specifications/typographical errors and quantity, reference shall be made to CDS Food Service Design Facility Consultant / Architect whose decision shall be conclusive.

C. In no instance shall a bid be submitted or any work started with any uncertainty.

D. Before doing any work or ordering any materials, the Contractors shall verify all measurements of any work and shall be responsible for their correctness. Any differences which may be found shall be submitted to CDS Food Service Design Facility Consultant / Architect for consideration before proceeding with the work.

E. Extra compensation will not be allowed because of differences between actual dimensions and measurements indicated on the working drawings.

F. Where a conflict occurs between or within standards, specifications, codes, ordinances and/or working drawings the more stringent or higher quality requirements shall apply.

1.8.2 APPLICABLE DOCUMENTS

A. Bidding Documents, Contract Forms and related materials issued by, the Project Architect, G.C. / C.M. and/or the Owner before awarding a contract apply to this section.

B. Architectural, Mechanical, Electrical and Structural Plans and other Specifications including all supplements issued thereto and other pertinent documents issued by CDS Food Service Design Facility Consultant, the Project Architect, C.M. and/or the Owner, are a part of these Specifications and the accompanying food service equipment plans and shall be complete within every respect. All the above included herewith, will be issued separately by C.M., or is on file at CDS Food Service Design Facility Consultant / Project Architect's office and shall not relieve the Contractors of responsibility or be used as a basis for additional compensation due to omission(s) of Architectural, Structural, Mechanical, Plumbing or Electrical details from food service equipment documents.

1.8.3 SUBSTITUTIONS

A. Substitution request must be supplemented by sufficient information in the form of manufacturer's technical specifications, drawings, pictures and/or samples to evaluate equality, appearance and all other related conditions.

B. Written substitution requests must be submitted to CDS Food Service Design Facility Consultant in accordance with the guidelines and time lines as set forth by the Project Architect and/or Owner. Substitutions would not be considered if not submitted within these guidelines. Substitutions will not be allowed without prior written approval from CDS.

C. All submittals for proposed substitutions must be submitted with an equipment data sheet for each item. The data sheet shall consist of the project name, the Project Architect, the Foodservice Consultant, the firm submitting, the item number, the manufacturer, the manufacturer's model number, a complete written description of what is to be provided, an accessories and options list of what is to be provided, finishes, dimensions, utility requirements as provided (ie: gas: natural or LP, electrical: voltage/phase and amps, plumbing/mechanical: water/sewer, etc.) as well as type of connection. This information must be submitted not less than fifteen days from the bid due date to be considered as an alternate.

D. Where substitutions are made by the K.E.C. with the written approval of CDS Food Service Design Facility Consultant / Project Architect, the K.E.C. shall be responsible for and pay all costs of any consequential modifications which may result from the substitution.

E. If the K.E.C. decides to submit an alternate manufacturer and receives a written response from CDS Food Service Design Facility Consultant /Project Architect accepting this change, then all resulting expenses incurred in the changes or additions to the food service equipment work as well as other contractors work shall be the sole responsibility of the K.E.C. and shall be considered as part of the base bid with no additional compensation permitted.

F. The Manufacturer and model number of any article, device, material and/or form of construction listed in the “Itemized Specifications” as the “Primary Manufacturer” shall establish the “Basis of Design and Specification Standard”, with respect to the physical dimensions, characteristics, aspects, capacities, performance and/or quantities required herein. Pryor to bid, if the K.E.C chooses to utilize one of the non-Primary listed Design Facility Consultant’s, the K.E.C. shall submit that item for analysis and conclusive determination with respect to that item.

G. Accepted substitutions will be noted in an addendum issued by the PA/E. No other substitutions and/or deviations from the primary manufacturer will be permitted subsequent to the date of the Bid Opening, except by specific change order and only with responsibilities as outlined herein.

1.8.4 INTENT

A. It is the intent of the Contract Documents for each and every item and/or component to be complete with all required devices and standard features necessary for that item and/or component to properly function.

B. It is the intent of the Contract Documents for each and every item and/or component to function and perform in a manner equal to the Primary Manufacturer’s intent. K.E.C. is required to notify CDS Food Service Design Facility Consultant / Project Architect in writing of any or all discrepancies or omissions of any components prior to submitting bid.

C. Failure of the K.E.C. to report any discrepancies and/or omissions prior to submitting his bid shall not relieve the K.E.C. of his responsibilities for providing complete, functioning, workable systems in full accordance with the intent of the Contract Documents.

1.9 WARRANTIES AND GUARANTEES

A. Equipment and Appliance Warranties: Furnish manufacturer's standard written product warranties, any special project warranties and guarantees indicated for individual pieces of equipment, and any incidental equipment component warranties.

B. Warranties and guarantees shall be in addition to, shall be in effect simultaneously with, and shall not alter or limit other project or product warranties or guarantees, nor shall they serve as limitations to other remedies available to the Owner.

PART 2 - SCOPE

2.1 WORK INCLUDED

A. Work required under this section consists of providing all necessary services, tools, equipment, material and labor required to provide the continuous installation (the term installation shall mean the complete installation including, but not limited to, the delivery of all food service equipment items and necessary components complete with transportation charges and taxes prepaid by the K.E.C. to the job site's location) as designated on the food service equipment plan, uncrated, erected, set in place, leveled and made ready for final connection, by G.C., to plumbing, gas, electrical and/or steam utilities and properly anchored and/or trimmed as may be required.

B. K.E.C. is to deliver all parts and/or components, which are to be built into cast-in-place concrete and/or masonry in ample time for inclusion in the concrete and/or masonry work. Furnish necessary setting plans and/or instructions, oversee the installation of all parts in the masonry and/or concrete and be responsible for the correctness and accuracy of the location and installation.

C. K.E.C. to provide holes, ferrules and/or stainless-steel chases on equipment for pipes, drains, electrical outlets, conduits and similar items as may be required to coordinate and accommodate the installation of the food service equipment in connection with the work of other contractors.

D. K.E.C. to provide the necessary materials, labor, services and incidentals necessary for the completion of these sections of work including but not limited to adhesive, caulking, sealing, trim strips, chases, corner guards, corner trims and/or closure panels.

E. K.E.C. to provide items and components hereinafter specified and/or shown on plans, completely assembled or erected in locations indicated, ready for final connections to service, by the respective trades. The labor and material(s) required for final connections are the responsibility of G.C.

F. K.E.C. to provide and install where required fasteners, flashing, trim strips, filler panels, cant strips and caulking and/or sealant required to complete the installation.

G. All roof, wall and/or floor assemblies including finishes (as specified herein) penetrations, openings, curbs, platforms and/or dunnage pursuant to the requirements of the food service ventilation and/or refrigeration items are to be provide and installed by the G.C. unless specified otherwise.

H. Keep premises clean and remove from the site all crates, cartons and other debris resulting from the work. Leave all areas “broom cleaned” and all equipment items and furnishings “construction clean”.

Final cleaning, sanitizing and polish of all equipment items and furnishings shall be done by the K.E.C. Further, it is the K.E.C.’s responsibility to provide protective coverings for all equipment items delivered to the job site during construction.

2 RELATED WORK OF OTHER CONTRACTORS

GENERAL CONSTRUCTON BY G.C.

1. All floor assemblies including finishes, openings, depressions, sleeves, curbs and bases;
2. All wall and/or partition assemblies including finishes, openings, recesses, sleeves, furring and wall backing;
3. All ceiling assemblies including finishes, openings, soffits, access panels, fire separation and sleeves;
4. All roof assemblies including finishes, openings, curbs, platforms and dunnage;

5. All structural supports or grounds for hanging or fastening of food service equipment assemblies as may be described in this section;

6. G.C. to provide on-site storage trailer(s) and security for owner's existing and/or provided food service equipment to be used on this project, if applicable.

7. All exterior metal trim/covering for walk in refrigeration lines.

PLUMBING BY G.C.

1. Water, gas and steam supply systems, as required;

2. Sanitary and grease laden drainage systems;

3. Final plumbing connections including mounting of drains, faucets and piping from point of connection on equipment to building plumbing systems and interconnections between equipment components.

4. Grease traps.

5. Indirect drain line runs from equipment items to nearest floor drain or floor sink as required.

6. Gas shut off valve(s) as required for ventilator fire suppression system and gas regulators on individual pieces of gas fired equipment in accordance with the manufacturer's recommendations are to be provided by the K.E.C. and installed by the G.C.

7. K.E.C. to furnish faucets with nipples, elbows, supply lines and valve stops, drains and/or splash mounted vacuum breakers, etc. for each equipment item as specified herein. Items to be installed by the G.C.

8. All exposed plumbing related to or in connection with food service items to be chrome plated.

9. Indirect wastes shall be chrome plate and are to drip over and into floor drains. Where drains and/or supply lines run under equipment, provide the proper support from the underside of the equipment to eliminate interference with cleaning and/or maintenance.

H.V.A.C. - NA

ELECTRICAL BY G.C.

1. All electrical distribution, lighting and power systems except otherwise specified in this section.

2. Final electrical connections and inter-connections including labor and materials from point of connection on equipment to building electrical systems and required interconnections between equipment components.

3. All electrical materials including wire, conduit, over current protection, main switches, safety cut-outs, shunt-trip breakers, disconnect switches, lightning control devices, surge protectors, uninterruptible power units and controllers.

4. Shunt-trip breakers and/or contactors and all conduits and for shut down of electrically operated cooking equipment and/or ventilation equipment as required for ventilator fire suppression system.

5. Empty conduit systems for refrigeration system, as specified and/or shown on food service drawings.

6. Empty conduit system for point-of-sale system, as specified and /or shown on food service drawings.

7. Empty conduit system for fire suppression system, as specified and/or shown on food service drawings.

8. K.E.C. shall furnish all electrically operated portable and/or movable equipment items with factory installed 3-wire or 4-wire heavy duty insulated cord with a grounded plug with one leg of the cord grounded to a conductible portion of the items frame;

9. Furnish and install switches and/or disconnects within equipment, contactors combination starters with fused disconnects, controls and similar items necessary for the safe and proper operation of the equipment and for compliance with all N.E.C. and/or local AHJ requirements.

10. All switches, disconnects and/or control devices shall be safely accessible without reaching across or over any hot and/or hazardous equipment items.

11. K.E.C. to secure cords, to the underside of the equipment, on portable and/or movable equipment as to allow ease of maintenance or as required by the owner.

2.3 RELATED WORK BY OWNERS

A. Install Owner furnished equipment in accordance with the installation section of this document, unless otherwise specified herein.

PART 3 - QUALITY ASSURANCE

3.1 FOOD SERVICE CONSULTANT

A. The Owner has employed Culinary-Design Support as the Food Service Consultant. The “chain of command” shall be the Food Service Equipment Contractor, to the General Contractor / Construction Manager, to the Project Architect (PA / E), to the Food Service Consultant, and vice versa in all matters concerning the food service equipment.

3.2 EQUIPMENT

A. Equipment, with the exception of “buy-out” or standard catalogue items, shall be fabricated in a plant bearing the name of a recognized food service equipment fabricator. This fabricating firm shall have been in business at least ten years, with a suitable organization to design, engineer, manufacturer, deliver and install the equipment. Said installation shall be accordance with local union conditions when applicable. Such firms shall be able to refer to other successful installations of similar operating conditions. Further, the fabricator shall be able to UL classify and list the items that they fabricated. Under no circumstances shall the K.E.C. sublet any portion of the fabricated equipment to any sub-contractor without the CDS’s written approval. All fabricated food service equipment with inter-wiring and/or pre-wired equipment and/or refrigeration shall be manufactured by a fabricator that can UL list (or other applicable AHJ listing) and/or classify their own work.

3.3 LABOR

A. All labor shall be performed by experienced mechanics in this type of work. All work on the premises shall be done at such time as to promote the proper conduct of the project. Provide a competent on-site superintendent to supervise the work and to provide other trades with such information necessary to maintain proper conduct and timely completion of the work.

3.4 SECTION N/A

PART 4 - CODES, LAWS, AND STANDARDS

4.1 GENERAL REQUIREMENTS

A. Manufacture and install equipment in conformance with the Williams-Steiger Occupational Safety and Health Act of 1970, or other Local/National safety and health regulations as applicable.

B. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following:

1. National Fire Protection Association (NFPA)

a. NFPA 96-Installation of equipment for removal of smoke and grease-laden vapors from commercial cooking equipment, current edition.

b. NFPA 17 -Dry chemical extinguishing systems, current edition.

c. NFPA 17A-Wet chemical extinguishing systems, current edition.

d. NFPA 70-National Electric Code.

2. National Sanitation Foundation (NSF)

3. Underwriter's Laboratories, Inc. (UL), including but not limited to UL-300

4. National Electric Manufacturers Association (NEMA)

5. American Gas Association (AGA)

6. American Society for Mechanical Engineers for Steam Equipment

7. National Fuel Gas Code (NFGC)

8. Current State Board of Health Regulations

9. International Mechanical Code (IMC) 2015 or current

C. All electrically operated and/or heated equipment, fabricated or otherwise, shall conform to the latest standards of the National Electric Manufacturer's Association and the Underwriter's Laboratories, Inc., where applicable standards have been set up by that agency, or otherwise, such as to be acceptable to authorities having jurisdiction.

D. Note: For projects outside the U.S., compliance is required for any and/or all governing codes and regulations as may be required by the local AHJ.

PART 5 – SUBMITTALS

5.1 GENERAL REQUIREMENTS

A. Shop drawings, samples and brochures shall be submitted in electronic format at one time, in one complete submittal, within sufficient time not to delay work on the project and / or Architects time limit criteria after the G.C. has been awarded a contract by the Owner. Partial submittals will not be accepted.

B. Equipment List: Submit for approval, in electronic format within sufficient time not to delay work after notification of the Owner's award of contract, an itemized list of equipment to be furnished under this contract, to include manufacturer's name and model number, along with all necessary and/or required options and/or components, for each piece of equipment - necessary only if not using primary manufacturer and if prior approval for a substitute has been let.

5.2 SAMPLES

A. Provide all samples of materials requested by CDS Food Service Design Facility Consultant /Architect for test purposes or comparisons.

B. Samples used for testing shall not be used on the work without the written approval of CDS Food Service Design Facility Consultant / Architect.

C. Samples may be retained by CDS Food Service Design Facility Consultant, the Project Architect or the Owner as a matter of record without any additional compensation to the Contractors.

5.3 BROCHURES

A. Provide CDS Food Service Design Facility Consultant / Project Architect, thru the General Contractor for approval, in electronic format a complete brochure for review showing each piece of standard manufactured equipment, complete with all details and/or descriptions of the manufacturer's specifications. All alternate Equipment being submitted shall be listed/distinguished as an alternate item. The General Contractor will return the electronic formatted brochure (set) with comments noted for further action. Continue submitting until final approval from CDS Food Service Design Facility Consultant / Project Architect is achieved. After final approval provide a corrected/current updated electronic formatted brochure with such details and specifications clearly numbered with the item number as per the food service equipment plans with operators' manuals, service agency information and local rep. details for each item specified.

B. Record copy brochures shall be delivered at the demonstration and start-up, shall be in electronic format and ten (10) bound in booklet form, in three ring binders, and shall include the following:

1. A separate data sheet for each component or item of equipment indicating item number, description, quantity, manufacturer, model number, finishes, modifications, options and utility requirements.

2. Catalog specification sheet and / or manufacturer's specifications and drawings complete including accessories. Arrange booklets so those items are in numeric order in accord with the contract documents with each page numbered in relation to that item. Further, include with each specification sheet and/or drawing a copy of the warranty information, operations manual and service information; as well as a completed contractor's and the food service equipment contractor's guarantee and warranty.

5.4 SHOP, ROUGH-IN AND/OR MECHANICAL CONNECTION DRAWINGS

A. K.E.C. through the General Contractor shall provide CDS Food Service Design Facility Consultant / Project Architect one electronic formatted form shop drawings for review and comment by CDS Food Service Design Facility Consultant. The reviewed electronic formatted with comments noted will be returned for correction. Continue resubmitting until final approval by the PA / E or CDS Food Service Design Facility Consultant is achieved. Resubmit revised in electronic format approved submittals to the PA / E after final approval for distribution. Distribution to include but not be limited to the G.C / PA / E, Owner's Inspector, Owner's Representative, the Manufacturer, the K.E.C. and the plumber and electrical contractors.

B. K.E.C. shall submit in electronic format rough-in drawings locating all equipment (new, existing or as provided by owner) shown on the contract documents. The rough-in requirement drawing included in these documents are provided as an instrument of service and are not to be used for construction and/or reproductions. Provide drawings, in 1/4" =1'- 0" scale on sheets the same size as the contract documents, showing, with vertical and horizontal dimensions, the required rough-ins (including sleeves and conduits) for electric, gas, water, steam, sanitary waste, refrigeration, ventilation, condensation drain lines, air and exhaust connection and wood backing for wall mounted fixtures and equipment. Show details, sections and characteristics for slab depressions and/or other features and/or installation including data for all services in each area. Locations of equipment shall allow for traps, switches, and/or other final connection requirements. All drawings shall include floor plans shown equipment as per the contract documents, elevations, details and sections as may be required-only required if not utilizing primary specified manufacturer.

C. Provide complete plans with dimensions showing locations and elevations of all plumbing, electrical and mechanical rough-ins. Use same symbols, connection numbers, and dimensioning system as indicated in Contract Documents (scale shall be 1/4” = 1’ - 0”).

D. In the event rough-ins have been accomplished before the award of the contract, the Food Service Equipment Contractor shall check the existing facility and furnish all, approved equipment to suit Building conditions and utilities. No extra charges shall be allowed for utility changes to fit Equipment during installation and connection.

E. Provide complete plans and details showing locations and elevations of all depressions, bases, curtain walls and hoods and any critical wall dimensions. Use same dimensioning system as indicated in Contract Documents. (scale shall be 1/4” = 1’ - 0”).

F. Plumbing, electrical and mechanical rough-ins-all shown on the same sheet will not be accepted.

G. Provide complete details on each piece of custom-built equipment in plans, elevations and sections.

scale for elevations shall be 3/4” = 1’ - 0”

scale for sections shall be 1-1/2” = 1’- 0”

H. Fabrication details must identify all metal gauges, hardware, trim, electrical parts, special fitting and other components by manufacturer’s name and model number.

I. All items being submitted as an Alternate shall be hi-lighted/distinguished to show any/all utility variances that the General Contractor and Kitchen Contractor shall coordinate and be responsible for.

5.5 CHECKING

A. Checking of electronic formatted rough-in drawings, shop drawing, details and equipment by CDS Food Service Design Facility Consultant is for design concept only and does not relieve the K.E.C. or G.C. / C.M. of responsibility for compliance with design drawings, details and specifications, verification of utilities with equipment requirements for conformity and location and verification of all dimensions of equipment, building conditions or reasonable adjustments due to deviations. Drawings shall be prepared on the Food Service Equipment Contractor’s sheets and by his employees. Drawings of any part thereof created by photograph, paste-up, or other methods using CDS Food Service Design Facility Consultant and/or Architect’s drawing(s) and will be returned for re-submittal.

K.E.C. will assume responsibility for the proper locations and sizing of sleeves, conduits, and depressions for the various equipment requirements. K.E.C. is responsible for making multiple field inspections to verify the rough-in locations prior to the pouring of concrete, the closing of walls, etc. K.E.C. shall compensate other trades for any relocation of rough-ins.

5.6 MAILING AND DISTRIBUTION

A. All hard copy transparencies and/or prints shall be delivered in a mailing tube. Folded transparencies and/or prints shall be returned for re-submittal. After checking, supply the specified number of distribution prints for record purposes. All cad drawings shall be on cd with all drawings formatted as a *.dwg or *.dfx file.

PART 6 - PRODUCTS

6.1 PREFABRICATED EQUIPMENT

A. Where reference is made to a manufacturer's model number and/or manufacturer's specifications, it is intended that the specifications of that primary manufacturer is utilized as a basis of design and specification standard and has become a part of these Specifications and Documents.

B. Items and /or component parts of any item referred to by manufacturer's name and model number shall be furnished complete with all standard equipment of the manufacturer used as a basis of design and specification standards plus all extras and/or modifications hereinafter specified and/or required.

C. Similar type items and/or similar type components shall be the product by the same manufacturer to facilitate maintenance, convenience and reduce the Owner's spare parts inventory.

D. Modifications to standard equipment specified shall be made by the original manufacturer, when required.

6.2 PRODUCT OR MANUFACTURER APPROVAL

A. The product of the primary manufacturer named, where more than one manufacturer is listed, was used for the basis of design and specification standard and sets the standard of quality, appearance, performance, aspect, capacities and function for that item.

B. Only products of listed primary manufacturers will be acceptable unless requests for substitutions and/or submittals of alternate manufacturers are submitted to CDS Food Service Design Facility Consultant in accordance with stated conditions. Alternate manufacturers are approved as a manufacturer; however, each item for an alternate manufacturer must be submitted to CDS Food Service Design Facility Consultant for approval/rejection.

C. Other manufacturers must modify their product, if necessary, to comply with the quality, physical and functional characteristics of the primary manufacturer and must be approved by CDS Food Service Design Facility Consultant.

D. All manufacturers listed may not be able to supply an equipment item, pursuant to the specifications, as standardized by the primary manufacturer whose name and model number was utilized herein as the basis of design standard for this project, in which case, the listed alternate manufacturers may elect to modify an item to meet the specifications.

E. All approval requests shall include a complete set of criteria and drawings.

6.3 CONSTRUCTION

6.3.1 GENERAL

A. The materials, components and techniques describe the construction of items of the Food Service Equipment.

B. Deviation and extra refinements peculiar to any one item will be described and/or indicated.

C. It is required that all custom/fabricated items in these plans and specifications, other than by manufacturer name and model number, will be constructed of 300 series stainless steel and be Manufactured by one fabricator that can UL list and/or classify their own products.

D. All exposed surfaces of equipment shall be free of bolts, screws and rivets. Wherever these fasteners are used they shall be an approved type constructed of stainless steel.

E. Type 200/400 series stainless steel is not acceptable.

6.3.2 TOPS

A. All table tops, counter tops, sinks bowls, drain boards and troughs are to be fabricated with 14-gauge, 300 series stainless steel.

B. Where the tops are adjacent to walls, columns, equipment, enclosures, etc. they shall have a splash. The standard splash shall be 8” and will be formed by turning up with a 2-5/8” flange at 45 degrees and a 3/4” turn down.

C. Ends adjacent to similar equipment shall have common end caps.

6.3.3 ENCLOSED BASES

A. Enclosed base fixtures shall be stainless steel wrapper type/unitized body construction.

B. Tops shall be cross-braced with galvanized steel channels or angles spaced at 2’0” O.C. maximum.

C. Leg channels shall be 1” X 4” X 14-gauge stainless steel channels spaced 4’0” O.C. maximum, on bottom, to receive legs.

D. Closed base fixtures shall be mounted on casters, Durable #75PP40GT9006TY or Durable #75PP50GT9076TY. Counters mounted on feet shall Component Hardware A10-0851-C stainless steel adjustable counter type, as indicated on plans and/or item specifications.

E. Shelf supports shall be continuous 1-1/2” X 1-1/2” X 14-gauge stainless steel angles welded to frame. There shall be no exposed galvanized steel channels or supports.

F. Utility chases shall be 18-gauge stainless steel, with removable access or service panels.

G. Partitions shall be 18-gauge stainless steel construction.

H. Exterior panels shall be FRP plastic laminate when a part of millwork, or stainless steel with vertical grain as specified in item specifications.

I. Non-exposed panels adjacent to walls or closed base fixtures shall be 18-gauge stainless steel.

J. Interior shelf units shall be 18-gauge stainless steel, edges turned up 1-1/2" at sides and rear, down 1-1/2" at front and where shelves butt together, corners to be welded. Shelves shall be fixed or removable sections (2'-0" maximum) for ease of removal and cleaning if called for in itemized specification.

K. Compressor compartments shall have removable 18-gauge stainless steel single pan louvered panels. Provide top of panel with finger holes for lifting and removal.

L. Recessed or liner areas shall be lined with 18-gauge stainless steel.

M. Plastic laminated panels shall have a 3/4" thick exterior plywood base veneered on all exposed sides and edges with Wilsonart, Formica or Westinghouse Micarta plastic applied or laminated in strict accordance with manufacturer's recommendations. Plastic laminated panels shall be without joints and grain and pattern material, color, pattern and/or texture shall be as approved by Project Architect.

N. Trim shall be 18-gauge 300 series stainless steel with vertical grain.

O. Stainless steel and brass trim shall have flush welded joints.

P. Control panel recesses, valve handle recesses and individual control knob recesses shall be 18-gauge stainless steel. Depth must be sufficient to prevent control from protruding past face of body panel.

Q. Legs shall fit into Component Hardware No. A18-0206-C Conical Gussets. Weld to framing members of counter. Provide 3-1/2" square 12-gauge stainless steel top plate welded on legs that are bolted onto equipment. Secure with four (4) 1/4-20 stainless steel bolts.

R. Cashier's stations shall have 18-gauge stainless steel interior liners, cash drawer CH #CD100 Liners shall come with a 1" dia. stainless steel foot rest, 18-gauge stainless steel undershelf or pull-out shelf.

6.3.4 COLD PANS – NA

6.3.5 COOLER / FREEZER ASSEMBLIES - NA

6.3.6 COOLER / FREEZER COMPONENTS - NA

6.3.7 UNDERCOUNTER REFRIGERATORS / FREEZERS - NA

6.3.8 UNDERCOUNTER REFRIGERATION SYSTEMS - NA

6.3.9 DISHTABLES - NA

.

6.3.10 DISPLAY SHELVES - NA

6.3.11 DOORS

A. Metal doors shall have 18-gauge stainless steel exteriors and interiors. Form 3/4” X 90-degree edges on all sides and weld corners. Rear panels must slip inside front panels and form double pan assembly with tight joints.

B. Insulation between panels shall be 3/4” fiberglass. Secure to both panels where hardware or other screw fastenings are required.

C. Metal doors shall have 12-gauge steel tap-in plates welded to inside of panels where hardware or other screw fastenings are required.

D. Sliding door tracks shall be Component Hardware, CHG Series. Secure with 1/4- stainless steel bolts.

E. Sliding door roller assemblies shall be Component Hardware CHG Series.

F. Sliding and hinged door pulls to be integral, and shall be formed type as shown on plans.

G. Hinged doors shall be mounted on Component Hardware stainless steel continuous hinges with 3/16” diameter stainless steel pins or Component Hardware #75-1002 stainless steel lift-off type hinges. Hinged door magnetic latches shall be Component Hardware Series #M32-2401.

H. Doors shall have stainless steel guide pins Component Hardware Series, #M22-2420

6.3.12 DRAINBOARDS - NA

6.3.13 SINKS - NA

6.3.14 DRAWERS - NA

6.3.15 DRIP PANS - NA

6.3.16 ELECTRICAL - NA

6.3.17 HANGER ASSEMBLIES

A. Framing members for hoods, hoist or other equipment with live load of 500 pounds or weighing over 500 pounds shall be 2” X 2” X 1/4” steel angles spaced at 36” O.C. maximum.

B. Hangers for piping, refrigerant lines and beverage dispenser conduit shall be Power- Strut metal framing with Series PS-300 channels, Series PS-10 spring clamping nuts, 1/2” diameter hanger rods, brackets, beam clamps, conduit clamps for each pipe or line and fasteners.

C. Horizontal runs of two or more pipes or lines shall have Power-Strut trapeze hanger and / or surface mounting assemblies spaced at 60” O.C. for lines smaller than 3/4” O.D., 72” O.C. for lines 3/4” to 1-1/2” O.D. for lines 1-5/8” O.D. or larger.

D. Horizontal and vertical runs adjacent to building walls shall have surface mounted assemblies with same spacing and trapeze assembly.

6.3.18 OPEN BASES

A. Legs shall be constructed of 1-5/8” O.D. X 16-gauge stainless steel tubing.

B. Maximum spacing shall be 72” below worktables and 60” below dish tables, sinks and drain boards.

C. Cross rails shall be constructed of 1-5/8” O.D. X 16-gauge stainless steel and shall be welded and polished to legs.

D. Install cross rails 10” above floor.

E. Legs on stationary equipment shall have No. A10-0851-C Component Hardware, stainless steel adjustable bullet feet.

PART 7 - PROCEDURES

7.1 WORKMANSHIP

A. Entire procedure, including materials, workmanship, details, fabrication and fastening methods shall comply with applicable standards.

B. Workmanship and finishes shall be in accordance with best practices of the trade. Only skilled workers shall be employed in the fabrication and erection of the work of this section.

C. Work shall be provided complete in every detail and the finished work shall be strong, rigid, neat in appearance and free from defects as may be determined by the Owner / Project Architect and/or CDS.

7.2 WELDING

A. Joints in stainless steel shall be electrically welded using stainless steel electrodes. All welds shall be free of pits and flaws. Acetylene welding or silver soldering will not be acceptable.

B. Joints in galvanized material shall be electrically welded using electrodes designed to weld galvanized metal. All welds shall be free of pits and flaws.

C. Acetylene welding will not be acceptable. Materials spot welded together shall have welds equally spaced in straight parallel or perpendicular lines. Spot welding procedure or technique is to be in strict accordance with recommendations of material and/or welding machine manufacturer.

7.3 FINISHING

A. Joints in stainless steel that have been welded shall be ground smooth and polished to a No. 4 finish. The grain shall be blended into the grain of surrounding surfaces.

B. Powder coated items shall have a fifteen year warranty against chipping, cracking, fading, scratching and/or damage due to temperature. Colors to be selected by Project Architect. Finish and materials to approved for foodservice use by all governing agencies.

PART 8 - MATERIALS

8.1 HARDWARE

A. Hardware used in the construction of custom-built equipment shall be standards product of an approved hardware manufacturer and/or as approved by CDS / Project Architect.

8.2 STAINLESS STEEL COMPONENTS

A. Flat sheets shall be type 304 with no.3 finish, in accordance with ASTM-A-167-70 standard. Materials shall be new, of prime quality, full gauge thickness. Stainless steel shall be type 304, 18-8 series, with a content of from 17% to 19% chrome, 7% to 10% nickel and a maximum carbon content of 0.09. Exposed surface shall be interpreted to include all inside surfaces exposed to view when item is open.

B. Structural shapes shall be type 304 with no.3 finish on all exposed surfaces.

C. Hardware and fittings shall be the standard product of the manufacturer named as a standard.

D. Tubes shall be type 304, ornamental grade, with no. 4 finish, 16 gauge minimum, seamless drawn.

8.3 GALVANIZED STEEL COMPONENTS - N/A

8.4 BRASS COMPONENTS – NA

8.5 COPPER COMPONENTS - NA

8.6 STRUCTURAL STEEL SHAPES

A. Angles, channels, rods and bars used as framing members shall be extruded shapes that are uniform in cross-section, ductile in quality and free from hard spots, runs, checks or other defects.

B. Structural shapes shall conform to ASTM-A-36-70 standard.

C. Bent or formed sheet metal will not be acceptable as a substitute for structural materials, unless prior approval in writing is obtained from CDS / Project Architect.

8.7 CASTERS

A. Casters on prefabricated equipment shall be the equipment manufacturer's standard product as specified under the itemized equipment list.

B. Casters on custom-built equipment shall be Durable N.S.F. non-marking polyurethane or approved substitute or as specified under itemized specifications.

C. Casters shall have wheel sizes indicated.

D. Standard duty (S.D.) stem casters shall be No. #75PP50GT9076TY, swivel plate casters or #75PP40GT9006TY.

E. Heavy duty (H.D.) casters shall be #75PP50GT9006TY plate casters.

F. Secure plate casters with four (4) 1/4-20 stainless steel bolts, stainless steel lock washers, and stainless-steel nuts.

G. All casters shall be adjustable, cam acting, side lever with positive brake shoe on the wheel tread.

8.8 INSULATION - NA

8.9 WOOD – NA

8.10 FIBERGLASS (FRP) – NA

8.11 PLASTIC LAMINATING - NA

PART 9 – INSTALLATION

9.1 PLACEMENT

A. Do all fitting and fastening necessary to install fixed items or sub-items in permanent position as shown on plans.

B. Place all portable items or sub-items which do not require plumbing or electrical services as shown on plans or as directed by CDS / Project Architect**.**

9.2 ERECTION

A. Work shall be erected plumb, square and unwrapped by experienced personnel.

B. Protect all metal surfaces in contact with masonry, concrete and/or dissimilar metals with and acceptable nonabsorbent tape and/or gasket material.

C. Work shall be erected in correct horizontal and vertical alignment at the locations shown on the drawings.

D. Frames shall be anchored in place with sufficient anchorage to withstand live load with no apparent movement or tendency to fail.

E. Installation screws and fasteners shall be installed carefully to avoid scratching and/or damaging adjacent surfaces and/or fastener heads and shall be stainless steel.

F. At completion of erection work, finished surfaces shall be free of hammer and tool marks, scratches, blemishes, rust and stains.

G. Equipment shall be suitably protected, by K.E.C. during installation to prevent damage by other trades.

H. Provide general &/or seismic restraining devices in areas requiring such, as per local codes.

9.3 CLEARANCE

A. Edges of splashes on open base fixtures that are adjacent to walls shall have a 3” cleaning clearance or be sealed, seal bead not to exceed 3/8”, against wall.

B. Edges of splashes on closed base fixtures that are adjacent to wall or other solid fixtures higher than the splash shall form tight hairline joints. Seal joints with transparent Geoprene, General Electric or Dow silicone sealant. All excess sealant to be cleaned out to a smooth radius fillet.

9.4 FIELD JOINTS

A. Field joints in stainless steel and/or brass tops shall be welded or fused and finished as specified herein.

9.5 UTILITY SERVICE CONNECTIONS

A. Plumbing, electrical and mechanical furnished by the K.E.C. shall be limited to that which is built-in or is an integral part of the equipment itself.

B. Final utility installation and connections shall be by related trades and is to be included in the G.C. and/or C.M. contracts.

C. Provide restraining devices with mobile cooking equipment as required.

9.6 CONTRACTOR COOPERATION

A. Cooperate with and render all necessary assistance to other Contractors concerned with roughing-in and final connection of utility services for this contract.

B. After final utility connections are made, thoroughly clean , sanitize, polish and inspect the proper function of all items.

C. Report malfunctioning, incomplete or missing items, Owner furnished equipment or components to CDS/ Project Architect

9.7 ACCEPTANCE

A. CDS Food Design Facility Consultant will inspect the completed work connected with this section for compliance to the Contract Documents, upon notification by the Owner, Project Architect or K.E.C. which- ever occurs first.

B. Prior to acceptance of the work of this Section, K.E.C. shall clean, sanitize, polish and treat all stainless steel, cast iron, enamel porcelain and other type surfaces in accordance with manufacturer's recommendations and/or procedures.

C. Prior to acceptance of this Section, K.E.C shall clean and retouch all painted surfaces, powder-coated surfaces that have been damaged must be re-finished by an established powder-coating firm.

9.10 TESTING, DEMONSTRATING AND INSTRUCTING

A. Stipulated retainage of payment shall be mandated by the Owner. Retainage will be released only after the requirements of this section of these specifications are met in their entirety and to the complete satisfaction of the Owner's Project Manager.

B. K.E.C. shall at the completion of this work remove all debris, crating, packaging materials and implements associated with this work leaving the area broom clean.

C. K.E.C. shall provide and maintain protective covering for finished surfaces and other parts of equipment and/or cooler/freezer assemblies subject to damage during and after installation.

D. Clean, test, adjust, calibrate by a factory authorized service agency all foodservice equipment and fixtures to make ready for operation when the facility is turned over to the Owner.

E. After the above is complete, all items furnished under this Contract shall be operated and thoroughly tested to insure proper safe operation. The Owner, the Food Service Consultant, the G.C. and / or C.M. shall be notified of this testing and is to be provided with a copy of the service agencies' report.

F. When the food service equipment has been cleaned and tested and is operating properly, the K.E.C. shall arrange to have equipment furnished under this section of the contract demonstrated, pursuant to the availability of the Owner and it's representatives, by an authorized representatives who are to instruct the Owner's designated personnel in the use, care and maintenance of the equipment.

NOTE: Attendance at the demonstration meeting is required of all manufacturers' designated representatives providing equipment under this Contract and is to occur at one meeting.

G. The K.E.C. shall be responsible for scheduling the demonstration meeting. Each manufacturer's representative shall be present at this meeting:

1. Demonstrate to and instruct the Owner's designated personnel as to the operation, use, care, cleaning and maintenance of all items of equipment and respond to all questions and concerns by written response.

2. Provide the Owner's designated representative with the name, address and telephone number of a designee of each manufacturer and state which designee shall be responsible to quickly respond to warranty work 24 hours a day, 365 days a year. This is to be direct contact. The Owner may contact such warranty representative's designee directly, and such designee may respond without voiding any responsibility or warranties of the manufacturer, the K.E.C., the G.C. Service charges for this warranty representative, no matter what the resolution of the problem may be, shall be the responsibility of the manufacturer, the K.E.C., the G.C. In any event, the K.E.C. shall be responsible to immediately pay upon invoice, charges by the warranty representative in order to keep the warranty representative responsive. Whether the plumbing, electrical, food service equipment or other sub-contractors (or even the Owner) should be back charged will be resolved later.

3. Provide the Owner's representative with three (3) sets of operation maintenance manuals for each item of equipment furnished under this contract. This set shall electronically formatted and be neatly bound in a three ring binder, by K.E.C. with the delivery of this booklet receipted at the time of delivery.

4. Attendance at the one demonstration meeting is required of all manufacturers' representatives providing equipment under this contract, if for any reason an additional meeting must be scheduled the K.E.C. will be responsible for all additional fees and costs incurred.

PART 10 - CORRECTION OF DEFECTS, SERVICES AND GUARANTEE

10.1 GENERAL

A. K.E.C. shall replace, at the Owner's, CDS Food Design Facility Consultant's and/or the Project Architect's discretion, or make satisfactory repairs to any item of equipment that fails to conform to the requirements of the Contract at the time and shall remedy any defects due to faulty materials or workmanship which appear within a period of one (1) year from start-up and demonstration of equipment.

B. Items shall be tested and adjusted by skilled mechanics and this Contractor shall guarantee the material and workmanship of the equipment furnished by him under these specifications, for a period of one (1) year after acceptance by Owner.

C. All equipment, refrigeration systems and ice makers shall have start-up and a two (2) year extended service warranty for parts and labor and five (5) year extended warranty on compressors which will start on the date of Owner's acceptance. The cost of all warranties shall be included in the bid proposal and contract sum and shall serve as a prepaid service contract.

D. Contractors who do not normally maintain local refrigeration service personnel shall be required to provide the Owner with a refrigeration service policy in writing from local refrigeration service company that maintains a twenty-four (24) hour call service and that is acceptable to the Owner for a period of one (1) year at no additional expense to the Owner

E. Provide to Owner a listing of factory authorized service agencies and copies of written service and warranty agreements on all items of equipment provided under this contract, excluding Owner furnished and/or existing items.

F. Service contracts on refrigeration systems must be contracted for by the K.E.C. with authorized local service organizations capable of providing prompt and efficient service. Submit six copies of all service contracts, as specified herein, upon completion of the installation of the equipment to the Owner.

PART 11 - MISCELLANEOUS REQUIREMENTS

11.1 UNIFORM QUALITY

A. All Custom built items must be constructed by the same fabricator to insure uniform quality and appearance.

B. Similar type items of manufacture and/or prefabricated equipment must be the product of the same manufacturer.

11.2 IDENTIFICATION PLATES

A. Each piece of equipment must have a suitable nameplate supplied by the manufacturer that is to include the name of the manufacturer, the electrical and/or utility demands.

B. Each switch and/or control device shall have an approved nameplate indicating its function or purpose such as display shelf lights, frost plate compressor and plate warmer.

C. Indicator dials and other standard components of prefabricated equipment will be considered acceptable identification of their physical location clearly indicating the warmers and/or other equipment items that they control.

D. All nameplates must be non-corrosive metal with engraved letters or have acid etched, phenolic and / or painted letters.

END OF GENERAL SPECIFICATION 11400

ITEMIZED SPECIFICATION 11400

ITEM # 101 ICE MAKER, CUBE-STYLE

Quantity: One (1)
Manufacturer: Scotsman
Model: MC0522SA-32

Prodigy ELITE® Ice Maker, cube style, air-cooled, self-contained condenser, production capacity up to 475 lb/24 hours at 70°/50° (340 lb AHRI certified at 90°/70°), small cube size, ICELINQ® mobile app, Bluetooth® connectivIty, preservation mode, external bin full indicator, AutoAlert™ indicating lights, WaterSense adjustable purge control, one-touch cleaning, harvest assist, front facing removable air filter, unit specific QR code, stainless steel finish, AgION™ antimicrobial protection, 208-230v/60/1-ph, 6.5 amps, cULus, NSF, engineered and assembled in USA
One (1) NOTE: Sale of this product must comply with Scotsman's MSRP Policy; contact your Scotsman representative for details

One (1) 3 year parts & labor warranties
One (1) 5 year parts & labor warranties on Evaporator
One (1) 5 year parts on compressor & condenser
One (1) Model KBILC Basic Ice Level Control, thermistor technology
One (1) Model XR-30 XSafe™ Sanitation System,
One (1) Power cord, NEMA 1-15P plug

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Hoshizaki, Manitowoc

ITEM # 101.1 WATER FILTRATION SYSTEM, FOR ICE MACHINES

Quantity: One (1)
Manufacturer: Scotsman
Model: AP1-P

AquaPatrol™ Plus Water Filtration System, single system, 2.1 gallons per minute max flow, designed for cubers up to 650 lb, and for flakers, nuggets & nugget dispensers up to 1,200 lb, cULus, NSF

One (1) Model APRC1-P AquaPatrol™ Plus Water Filter Replacement cartridge

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Hoshizaki, Manitowoc

ITEM # 102 ICE BIN FOR ICE MACHINES

Quantity: One (1)
Manufacturer: Scotsman
Model: B322S

Ice Bin, top-hinged front-opening door, 370 lb application capacity, for top-mounted ice maker, 22" width, metallic finish exterior, toolless removable baffle, polyurethane insulation, polyethylene liner, includes 6" legs, NSF, engineered and assembled in USA

One (1) 3 year parts & labor warranties
One (1) Model KHOLDER Ice Scoop Holder

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Hoshizaki, Manitowoc

ITEM # 103 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Atlanta Custom Fabricators

Floor Trough, 14-gauge stainless steel, NSF construction, 36"W x 12"D x 6" deep, with fiberglass grating, stainless steel removable strainer basket, 4" O.D. waste pipe 3"L, pitched towards waste, NSF

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: All Southern Fabricators, LTI
Note: The KEC shall deliver the floor trough to job-site only. The project Plumber shall set in place and final connect.

ITEM # 104 BREAD/BUNN RACKS-MOBILR

Quantity: Two(2)

By Owner/Vender

ITEM # 105 OPEN ITEM

ITEM # 106 HAND SINK

Quantity: Two (2)
Manufacturer: Krowne
Model: HS-30L

Space Saver Hand Sink, wall mount, 12"W x 14-1/4"D x 13-3/8"H OA, 9" wide x 9" front-to-back x 5" deep bowl, 4" OC splash mount faucet, 4-1/2" double bend faucet (low lead compliant), 7-3/4"H backsplash & side splashes on left & right, includes mounting bracket, stainless steel construction, NSF

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Advance, Eagle

ITEM # 108 REACH-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Beverage Air
Model: HBR27HC-1-G

One (1) Model HBR27HC-1-G Horizon Series Refrigerator, reach-in, one-section, 25.97 cu. ft. capacity, (1) right-hand hinged glass door, (3) adjustable shelves, electronic control, LED interior lighting, digital display, adaptive defrost, stainless steel interior & exterior, bottom mounted self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/4 HP, cULus, UL EPH Classified, UL-Sanitation

One (1) 7 year parts & labor and 7 year compressor warranty
One (1) Cord with NEMA 5-15P
One (1) Door hinged on right
One (1) Model GDL Glass door locks, per door
One (1) 6" Heavy duty casters (2) locking, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: True

ITEM # 109 MOBILE HEATED CABINET

Quantity: One (1)
Manufacturer: Cres Cor
Model: H135WUA11

Cabinet, Mobile Heated, with humidity, one compartment, insulated, bottom-mount heater assembly, field reversible dutch doors, recessed push/pull handles, (11) sets of chrome plated wire universal angle slides on 4-1/2" centers, adjustable 1-1/2" centers, analog thermometer, anti-microbial latches, aluminum construction, (4) 5" swivel casters (2) braked, cCSAus, CSA-Sanitation

- One (1) Standard Warranty: 1 year labor, 2 years parts warranty
- One (1) cord and plug, NEMA 5-20P, standard
- One (1) Right-hand door swing (top & bottom doors), standard
- One (1) 6" casters, set of 4

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Carter-Hoffman, FWE

ITEM # 110 EXHAUST HOOD WITH RETURN AIR PLENUM

Quantity: One (1)
Manufacturer: Accurex
Model XKE-GCV-S-11-1-0

Baffle Filter Canopy Hood, Wall Style, Exhaust Only with Single Wall Front
Provide Accurex Exhaust Hood Model XBEW as shown on plans and in accordance with the following specification:
Kitchen Ventilation hood(s) shall be of the Type I, exhaust only wall canopy. The hood(s) shall be U.L. 710 Listed without a fire damper (with optional) for medium, heavy, or extra-heavy duty rated cooking appliances. Please visit www.ul.com for U.L. 710 listing for performance and size options. Make-up air shall be independently provided.

The hood(s) exterior shall be constructed of a minimum of 18 gauge 400 series stainless steel.The hood(s) shall be constructed using the standing seam method for optimum strength and with a Performance Enhancing Lip (PEL) to improve capture efficiency by turning air back into the hood. An integral 3-inch air space is provided to meet NFPA® 96 clearance requirements against limited combustible walls. Integral 3-inch air space may be omitted for non-combustible construction. All seams, joints and penetrations of the hood enclosure shall be welded and/or liquid tight. Lighter material gauges, alternate material types and finishes are not acceptable. All unexposed interior surfaces shall be constructed of a minimum 18-gauge corrosion resistant steel including, but not limited to ducts, plenum, and brackets.

The hood(s) shall include a filter housing constructed of the same material as the hood. The filters shall be stainless steel baffle type U.L. 1046 Classified, and in sufficient number and size to ensure optimum performance. The filter housing shall terminate in a

pitched, full length grease trough which shall drain into removable grease containers. These filters shall have a grease removal efficiency of 28% at 8 microns (16% from 3-10 microns) and static pressure drop of 0.5-0.6 inWC.
Vapor proof, U.L. Listed LED light fixtures shall be pre-wired to a junction box located at the top of the hood for field connection. Wiring shall conform to the requirements of the NFPA® 70.
The canopy hood(s) shall be constructed by Accurex. They shall be built in accordance with the NFPA® 96, IMC, UMC, and bear the NSF Seal of Approval. The hood manufacturer shall provide, on request, the necessary data that confirms compliance with the code authorities listed above.

The Accurex Controls system shall be a UL listed outlet center which shall standardly consist of a NEMA-1 Stainless Steel Enclosure within a Stainless Steel Enclosure Panel, Printed Circuit Board (PCB), Full Color Touchscreen User Interface, hood, audible alarm, sensor(s) and Variable Frequency Drive(s) (VFD) or Motor Starters, with options for room temperature sensors and fan control through relays or 0-10 VDC signals. The PCB shall be capable of controlling multiple exhaust and supply fans via VFDs or analog signals. The control system shall utilize a combined control panel and hood light power connection with options for 110-120V / 50-60Hz / 1Ph input voltage or 220-240V / 50-60Hz / 1Ph input voltage, to be protected by a 15 Amp breaker. The control system shall be equipped with either Modbus or BACnet MSTP Building Management interfacing, and also be able to control up to 8 different ECM fans, alongside a 3-phase makeup air unit, without the need for added expansion boards or controllers. Standard Control enclosure fitted with handled, quarter-turn, slotted latched doors, or optional prison package configuration with handled, tamper-proof quarter turn latched doors.

The user interface shall be a full color touch screen with fan and light control, gas valve reset (optional), and balancing interfacing for proper kitchen fan balancing. The touchscreen shall have the capability to simultaneously control all fans and lights connected to the control panel with a single button. The touch screen shall be configured to push fit into a junction box, with no visible/exposed screws.

• In the event of the failure consisting of, but not limited to temperature sensor(s), VFD(s) and fire, the touch screen will automatically go to a fault page, which will describe the current fault. The fault will remain until the failure is corrected.

• The touchscreen shall be lighted, full color, and utilize simple plug and play connections. Touchscreen shall be mounted on the exhaust hood, a utility cabinet on the hood or wall, or shipped loose for remote mounting. If touchscreen is shipped loose for remote mounting, it shall be provided alongside optional 50ft or 100ft plug and play CAT5E cable for connection to main control PCB. All touchscreen mounting options will set the full color touchscreen centered on a stainless-steel faceplate, with no visible screws or fasteners on the faceplate

Constant Volume System Operation (XKC-CV):

The constant volume Accurex Controls shall utilize resistive type temperature sensors that are mounted in the capture tank of the hood to monitor exhaust air temperatures, and an optional room temperature sensor, shipped loose, to be installed to detect ambient air temperatures in the kitchen space. Temperature sensors shall be made of stainless steel and shall be installed in a UL approved coupling.

The system shall be capable of serving as an IMC compliant auto start-up control to automatically start the fans during cooking operations. Auto start-up operation is controlled by the measurement of an excess offset temperature between the exhaust temperature caused by cooking and the ambient room temperature in the kitchen (default offset temperature: 10°F, adjustable). If not equipped with a room temperature sensor, auto start-up operation shall be controlled by the measurement of an excess offset temperature between the exhaust temperature caused by cooking and the constant, preset room temperature (default preset room temperature set point: 75°F, adjustable. Default offset temperature: 10°F, adjustable. Default auto start-up initiates at 85°F as measured by the hood temperature sensor(s)). If any fan(s) are activated through the auto start-up operation, the fan(s) will not shut off automatically until the measured hood temperature(s) remain [temp interlock hysteresis]°F below the room temperature (preset or actual) for the length of the hysteresis timer (default temp interlock hysteresis: 5°F, adjustable. Default hysteresis timer: 5 minutes).

After fan initiation is triggered, either manually, through the touchscreen, or through the auto startup operation, the controller shall operate the associated exhaust and supply fan(s) at their design speeds via motor starters, VFDs, or analog signals. Control system shall also be fully compatible with 24VAC coil motor starters.

Additional Information:

In a fire condition, the control panel shall be capable of forcing the exhaust to maximum speed, shutdown of supply air, and shutdown of lights regardless of current fan speeds via integration with a fire system.

Utilities: Refer to FSE Hood Shop Drawings.
Acceptable Alternates: None

ITEM # 110.1 FIRE PROTECTION SYSTEM

Quantity: One (1)
Manufacturer: Accurex
Model R102 system

Utilities: Refer to FSE Hood Shop Drawings.
Acceptable Alternates: None

ITEM # 110.2 WALL FLASHING-STAINLESS STEEL

Quantity: One (1)
Manufacturer: Accurex

Refer to sheet FS3.1 for details.

Acceptable Alternates: None

ITEM # 111 FAN SYSTEM

Quantity: One (1)

By Mechanical Contractor

ITEM # 112 SERVICE FAUCET

Quantity: One (1)
Manufacturer: Krowne
Model: 16-127

Royal Series Service Faucet, splash-mounted, 8" centers, 6-1/2" long heavy cast spout with bail hook & hose thread, bracket can mount above or below, vacuum breaker, rough brass, low lead compliant, NSF, Includes internal check valves to prevent backflow & cross contamination

One (1) 3 year warranty, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Fisher, T&S Brass

ITEM # 113 LANDING TABLE

Quantity: One (1)
Manufacturer: Atlanta Custom Fabricators
Model Custom

Size and Shape as shown on Equipment Plan. Construct to Section 11400 Gen. Specifications and current NSF standards. The top shall be constructed with 14 ga. 300 stainless steel. All sides shall have a 1-1/2" standard turndown with a 1/2" angled return. All legs to be 1-5/8" dia.16 ga. 300 stainless steel tubing fitted with stainless steel adj. bullet feet. Provide legs with 1-5/8” dia. stainless steel tubing fully welded fully welded in cross rails on all sides. Table shall be supported by galvanized channel underbracing. Provide table with 1/8” thick sound deadening.

Utilities: None
Acceptable Alternates: LTI
Note: All custom fabrication shall be from one manufacturer.

ITEM # 114 HOTPLATE, COUNTERTOP, ELECTRIC

Quantity: Two (2)
Manufacturer: Garland
Model: ED-15THSE

Designer Series Hotplate, electric, 15" W, countertop, two burners, 7-1/2" sealed solid elements with individual six position controls with automatic cycle down to low if not in use, stainless steel front, sides, recessed top and 4" legs, 4kW, CSA, NSF (Garland)

Two (2) One year limited parts and labor warranty
Two (2) 4' cord & NEMA L6-30P
Two (2) Stainless steel main back and bottom

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 115 WORKTOP COOK STAND FREEZER

Quantity: One (1)
Manufacturer: Beverage Air
Model: WTFCS84HC

Worktop Cook Stand Freezer, two-section, 84"W, 17.46 cu. ft., (4) drawers, top drawer holds (3) left & (2) right) 12" x 20" x 6" pans per drawer & bottom drawer holds (3) left & (2) right) 12" x 20" x 6" pans per drawer (NOT included), digital display, fire-proof stainless steel top, front & sides (no heat shield required), full marine drip guard, aluminum interior, expans per drawerion valve technology, self-contained refrigeration, R290 Hydrocarbon refrigerant, 3/4 HP, cULus, UL EPH Classified, UL-Sanitation

One (1) 7 year parts & labor and 7 year compressor warranty
One (1) Cord with NEMA 5-15P
One (1) Compressor located on right, standard
One (1) Model 00B23-055D-01 Gasket Guard,
One (1) Model 00C31S074A 3" Casters, plate

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: True

ITEM # 116 GRIDDLE, ELECTRIC, COUNTERTOP

Quantity: One (1)
Manufacturer: Garland
Model: E24-48G

Griddle, electric, 48" W, countertop, 47-5/8" W x 24" D cooking surface, 3/4" thick smooth polished steel griddle plate, thermostatic controls, stainless steel front and sides, 4" legs, 16.0 kW (Garland)

One (1) One year limited parts and labor warranty
One (1) 77.0 amps, direct, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 117 OPEN ITEM

ITEM # 118 ELECTRIC FLOOR FRYER

Quantity: Two (2)
Manufacturer: Frymaster/Dean
Model: SR114E

Fryer, electric, floor model, 40 lbs. capacity, durable temperature probe, power switch, indicator light, includes: rack-type basket support, basket hanger & twin baskets, stainless steel frypot, front & door, aluminized sides, 6" adjustable steel legs, 14.0kW, cULus, CE, NSF

Two (2) field wired, no cord or plug
Two (2) Model 2302884 Frymaster®/Dean® Top Connecting Strip
Two (2) Model 8239414 Dean® Frypot Cover
Two (2) Fryer: 6" adjustable steel legs, std.
Two (2) Start-Up Program includes gas pressure check, boil out of all frypots, gas plumbing size, wiring inspection, proper basket lift operation, cleaning of all frypots with damp rag/paper towels, controller check & programming demonstration

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 119 FRENCH FRY WARMER

Quantity: One (1)
Manufacturer: Hatco
Model: GRFHS-26

Fry Holding Station, countertop, electric, ceramic heating elements, incandescent lights, pre-set thermostatically controlled heated base, stainless steel construction, 1200 watts, NSF, CE, cULus, Made in USA

One (1) NOTE: Includes 24/7 parts & service assistance,
One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty
One (1) Cord & plug, NEMA 5-15P
One (1) Toggle switch, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 120 WORKTOP FREEZER

Quantity: One (1)
Manufacturer: Beverage Air
Model: WTF60AHC-FIP

Worktop Freezer, two-section, 60"W, 14.39 cu. ft., (2) solid doors, (4) shelves, snap-in door gaskets, stainless steel exterior top, front, sides, door & grille, galvanized steel exterior back & bottom, aluminum interior, 4" foamed-in place backsplash, rear-mounted self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/2 HP, cULus, UL EPH Classified, UL-Sanitation

One (1) 7 year parts & labor and 7 year compressor warranty
One (1) Cord with NEMA 5-15P
One (1) Left door hinged left, right door hinged on right, standard
One (1) Solid hinged stainless steel doors, standard
One (1) 6" Heavy duty casters, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 121 WIRE SHELVING

Quantity: One (1)
Manufacturer: Advance Tabco
Model: EG-1848

One (1) Model EG-1848 Special Value Wire Shelving, 48"W x 18"D, heavy duty, green epoxy coated, NSF
Two (2) Model GB-18 Special Value Wire Shelving Wall Bracket, 18", single mount, heavy duty, green epoxy coated, includes: (2) brackets & (4) collar filler caps, NSF

Utilities: None
Acceptable Alternates: Eagle

ITEM # 122 OPEN ITEM

ITEM # 123 SERVING TABLE

Quantity: One (1)
Manufacturer: Atlanta Custom Fabricators
Model Custom

Size and Shape as shown on Equipment Plan. Construct to Section 11400 Gen. Specifications and current NSF standards. The top shall be constructed with 14 ga. 300 stainless steel. All sides shall have a 1-1/2" standard turndown with a 1/2" angled return. All legs to be 1-5/8" dia.16 ga. 300 stainless steel tubing fitted with stainless steel adj. bullet feet. Provide legs with 1-5/8" dia. stainless steel tubing fully welded fully welded in cross rails front to back and rear only. Provide opening for Item 125, Refrigerator. Table shall be supported by galvanized channel underbracing. Provide table with 1/8" thick sound deadening

Utilities: None
Acceptable Alternates: LTI
Note: All custom fabrication shall be from one manufacturer.

ITEM # 124 DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT

Quantity: One (1)
Manufacturer: Hatco
Model: GR2SDH-36D

Horizontal Display Warmer, countertop, (2) shelves (14) rods, thermostat, pre-focused infrared top heat, incandescent light, hardcoat aluminum base, tempered glass end panels, designer panels & corner caps, 4" legs, 2440 watts, cULus, UL EPH Classified, Made in USA

One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
One (1) NEMA L14-20P (domestic voltage), standard
One (1) Model HAL Halogen bulbs in lieu of standard display lights (4 bulbs)
One (1) Model STANDARD Clear Anodized Aluminum housing, finish
One (1) Model STANDARDBLACK Black, designer inset panel
One (1) Model BLACK Black, designer corner cap color

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 125 BACK BAR CABINET, REFRIGERATED

Quantity: Two (2)
Manufacturer: Beverage Air
Model: BB48HC-F-GS-B

Refrigerated Food Rated Back Bar Storage Cabinet, two-section, 48"W x 29-1/4"D x 34"H, 15.139 cu. ft., (2) locking sliding glass doors, snap-in door gasket, (4) epoxy coated steel shelves, (2) 1/2 barrel kegs, LED interior lighting with manual on/off switch, black exterior finish, 1" stainless steel top, stainless steel interior with radius corners is easy to keep clean & meets NSF Standard 7 for open food container, right-mounted self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/4 HP, 3 amps, 115v/60/1-ph, NEMA 5-15P, cULus, UL EPH Classified

Two (2) 7 year parts & labor and 7 year compressor warranty
Two (2) Cord with NEMA 5-15P
One (1) Compressor located on left
One (1) Compressor located on right
Two (2) Stainless steel back

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 126 SANDWICH / SALAD PREPARATION REFRIGERATOR

Quantity: One (1)
Manufacturer: Beverage Air
Model: SPE48HC-12

One (1) Model SPE48HC-12 Sandwich Top Refrigerated Counter, two-section, 48"W, 13.01 cu. ft., (2) doors, stainless steel top with opening for (12) 1/6 size pans, 10" cutting board, (4) shelves, stainless steel exterior, aluminum interior, rear-mounted self-contained refrigeration, (pans furnished are 4" deep, tops will accommodate 6" deep pans), R290 Hydrocarbon refrigerant, 1/6 HP, cULus, UL EPH Classified, UL-Sanitation
One (1) 7 year parts & labor and 7 year compressor warranty (excludes maintenance items)
One (1) 115v/60/1-ph, 2.0 amps, cord with NEMA 5-15P
One (1) Left door hinged left, right door hinged right, standard
One (1) Stainless steel back
One (1) 6" Heavy duty casters, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 127 HOT DOG GRILL

Quantity: One (1)
Manufacturer: APW Wyott (Middleby)
Model: HR-31S

Hot Dog Grill, (10) slanted chrome surface rollers, infinite controls, removable grease pan, stainless steel exterior, coated steel bottom, cULus, NSF, CE

One (1) 1 year parts & labor warranty, standard
One (1) NEMA 5-15P, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Gold Medal

ITEM # 128 HOT DOG BUN / ROLL WARMER

Quantity: Two (2)
Manufacturer: APW Wyott (Middleby)
Model: BW-50

Hot Dog Bun Warmer, free standing, (96) bun capacity, thermostatic controls, (1) drawer, removable pan, stainless steel drawer, slides & cabinet, 1" adjustable feet, cULus, CE

Two (2) 1 year parts & labor warranty, standard
Two (2) NEMA 5-15P, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Gold Medal

ITEM # 129 OPEN ITEM

ITEM # 130 SERVING TABLE

Quantity: One (1)
Manufacturer: Atlanta Custom Fabricators
Model Custom

Size and Shape as shown on Equipment Plan. Construct to Section 11400 Gen. Specifications and current NSF standards. The top shall be constructed with 14 ga. 300 stainless steel. All sides shall have a 1-1/2" standard turndown with a 1/2" angled return. All legs to be 1-5/8" dia.16 ga. 300 stainless steel tubing fitted with stainless steel adj. bullet feet. Provide legs with 1-5/8” dia. stainless steel tubing fully welded fully welded in cross rails front to back and rear only. Provide opening for Item 125, Refrigerator. Provide fully welded #18 ga. st. stl. Welded in undershelf for item 128, Bunn warmers. Table shall be supported by galvanized channel underbracing. Provide table with 1/8” thick sound deadening

Utilities: None
Acceptable Alternates” LTI
Note: All custom fabrication shall be from one manufacturer

ITEM # 131 OPEN ITEM

ITEM # 132 HEATED BUTTER DISPENSER

Quantity: One (1)
Manufacturer: Server Products
Model: 86540

BUTTER WARMER, MERCHANDISER & DISPENSER, water-bath warmer, with temperature sensing thermostat and wrap-around heating element, spout warmer (opposite instrument panel side), pump is preset for 1/4 oz. servings, with a 1 oz. max, adjustable in 1/8 oz. increments, plug within the pump prevents hot topping from splashing when dispensed (reduces back pressure), includes magnetic buttered popcorn merchandising sign and 3 qt. stainless steel jar (94009), stainless steel pump, 517 watts, 120v/60/1-ph, 4.3 amps, cord, NEMA 5-15P, CE, cULus, NSF

One (1) 2 Year warranty
One (1) Model 86791 Magnetic Decal, 6-13/16"W x 6-19/32"H, for 86540 Butter Merchandiser

ITEM # 133 POPCORN POPPER

Quantity: One (1)
Manufacturer: Gold Medal Products
Model: 2600

One (1) Model 2600 Super PopMaxx 16 oz. Popcorn Machine, electric, countertop, E-Z Kleen kettle, heated corn deck, 1710 watts, 120v/60/1-ph, cord, NEMA 5-15P, UL, NSF
One (1) All information & pricing is subject to change without notice; contact Gold Medal Products Co. for the most up-to-date pricing and information.

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: None

ITEM # 134 BEVERAGE TABLE

Quantity: One (1)
Manufacturer: Atlanta Custom Fabricators
Model Custom

Size and Shape as shown on Equipment Plan. Construct to Section 11400 Gen. Specifications and current NSF standards. The top shall be constructed with 14 ga. 300 stainless steel. Provide top with a 1" X 6" high backsplash with capped ends on rear and right side. Front and left shall have a 1-1/2" standard turndown with a 1/2" angled return. Provide top with an integral 10” x 14” x 10” deep 14 ga. stainless steel sink as shown on plan. Provide sink with standard basket waste. Provide deck knock-outs on on 4” centers for item 134.1 faucet. All legs to be 1-5/8" dia.16 ga. 300 stainless steel tubing fitted with stainless steel adj. bullet feet. Provide legs with 1-5/8” dia. stainless steel tubing fully welded fully welded in cross rails front to back and rear only. Provide opening in base for item 142, Ice Transport. Provide weld in 18 ga. st. stl. Undershelf where shown on plan. Table shall be supported by galvanized channel underbracing. Provide table with 1/8” thick sound deadening

Utilities: None
Acceptable Alternates” LTI
Note: All custom fabrication shall be from one manufacturer.

ITEM # 134.1 DECK MOUNT FAUCET

Quantity: One (1)
Manufacturer: Krowne
Model: 15-401L

Royal Series Faucet, deck mount, 4" centers, 6" gooseneck spout, 1/4 turn ceramic cartridge valve, low lead compliant, NSF, Includes internal check valves to prevent backflow & cross contamination

One (1) 3 year warranty, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Fisher, T&S Brass

ITEM # 135 WIRE SHELVING

Quantity: One (1)
Manufacturer: Advance Tabco
Model: EG-1836

One (1) Model EG-1836 Special Value Wire Shelving, 36"W x 18"D, heavy duty, green epoxy coated, NSF
One (1) Model EG-1848 Special Value Wire Shelving, 48"W x 18"D, heavy duty, green epoxy coated, NSF
Two (2) Model GB-18 Special Value Wire Shelving Wall Bracket, 18", single mount, heavy duty, green epoxy coated, includes: (2) brackets & (4) collar filler caps, NSF
One (1) Model GDB-18 Special Value Wire Shelving Wall Bracket, 18", double mount, heavy duty, green epoxy coated, includes: (1) bracket, for use between adjoining shelves, NSF

Utilities: None.
Acceptable Alternates: Eagle

ITEM # 136 COFFEE BREWER FOR AIRPOT

Quantity: One (1)

By Owner/Vender
Note: KEC shall verify all utilities at time of submittal.

ITEM # 137 COFFEE AIRPOT

Quantity: One (1)

By Owner/Vender

ITEM # 138 ICE TEA BREWER

Quantity: One (1)
Manufacturer: Custom

By Owner/Vender
Note: KEC shall verify all utilizes at time of submittal

ITEM # 139 ICE TEA DISPENSER

Quantity: Two (2)
Manufacturer: Custom

By Owner/Vender

ITEM # 140 DISPOSABLE CUP DISPENSER

Quantity: One (1)
Manufacturer: Antunes
Model: DACS-20

One (1) Model DACS-20 Dial-A-Cup Dispenser, cabinet design, contains two DAC-10 components, 9-1/4"W x 24"D x 20-3/8"H, 8-1/4" collar dia., 5-7/8" tube dia., 23" tube length, holds cup size 8 oz. to 64 oz., stainless steel outer shell
One (1) 90 day warranty, standard (contact factory for information)

Utilities: None.
Acceptable Alternates: Dispense-Rite

ITEM # 141 PASS-THRU WINDOW

Quantity: Two (2)

By Architect

ITEM # 142 ICE BIN / ICE CADDY, MOBILE

Quantity: One (1)
Manufacturer: Cambro
Model: ICS125L110

Ice Caddy, mobile, 29-1/4"H, 125 lb. capacity, lid slides back & under, polyethylene body with foam insulation, molded in handles, recessed front drain faucet, no assembly required, (4) 5" casters (2 fixed, 2 swivel, 1 with brake), black, NSF, Made in USA

Utilities: None.
Acceptable Alternates: None

ITEM # 143 OPEN ITEM

ITEM # 144 SNACK BOEAD

Quantity: Two (2)

By Architect

ITEM # 145 REACH-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Beverage Air
Model: HBR27HC-1-G

Refrigerator, reach-in, one-section, 25.97 cu. ft. capacity, (1) right-hand hinged glass door, (3) adjustable shelves, electronic control, LED interior lighting, digital display, adaptive defrost, stainless steel interior & exterior, bottom mounted self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/4 HP, cULus, UL EPH Classified, UL-Sanitation

One (1) 7 year parts & labor and 7 year compressor warranty
One (1) cord with NEMA 5-15P
One (1) Door hinged on right standard
One (1) Model GDL Glass door locks, per door
One (1) 6" Heavy duty casters (2) locking, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: True

ITEM # 146 OPEN ITEM

ITEM # 147 THREE (3) COMPARTMENT SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: K7-CS-32

Convenience Store Sink, 3-compartment, with left & right-hand drainboards, 20" front-to-back x 12" W compartment, 12" deep with 8-1/2"H backsplash, stainless steel open frame base, side crossrails, adjustable metal bullet feet, 18 gauge 304 stainless steel, 12" drainboards, overall 25-1/2" F/B x 64" L/R

Three (3) Model K-15 Lever Waste Drain, twist handle operated with built in overflow,
Three (3) Model K-4 Support Bracket, for lever waste drain handle

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: ACF, Eagle

ITEM # 147.1 PRE-RINSE FAUCET ASSEMBLY, WITH ADD ON FAUCET

Quantity: One (1)
Manufacturer: Krowne
Model: 17-109WL

Royal Series, pre-rinse Assembly, with add-on faucet, wall mount, 8" centers, spring action flexible gooseneck, 38"H stainless steel hose with 15" overhang & 1.2 GPM spray head, built in check valves, 2.0 GPM add-on faucet with 12" swing spout, quarter-turn ceramic cartridge valves, includes wall bracket & mounting kit, chrome plated brass base, low lead compliant, includes internal check valves to prevent backflow & cross contamination, NSF (interchangeable with most brands) (ships pre-assembled)
One (1) 3 year warranty, standard

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Fisher, T&S Brass

ITEM # 148 WIRE SHELVING

Quantity: One (1)
Manufacturer: Advance Tabco
Model: EG-1872

One (1) Model EG-1872 Special Value Wire Shelving, 72"W x 18"D, heavy duty, green epoxy coated, NSF
Two (2) Model GB-18 Special Value Wire Shelving Wall Bracket, 18", single mount, heavy duty, green epoxy coated, includes: (2) brackets & (4) collar filler caps, NSF

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: Eagle

ITEM # 149 CONDIMENT COUNTERS-MOBILE

Quantity: One (1)
Manufacturer: Atlanta Custom Fabricators

Size and Shape as shown on Equipment Plan. Construct to Section 11 4000 General Specifications and current NSF standards. Construct top of 14 ga. 300 series stainless steel with all edges having a 1-1/2" standard turndown with 1/2" mitered return. Base shall enclosed counter wrapper type of 18 ga. 300 series stainless- steel construction. Base shall a fully welded in bottom and intermediate 18 ga. 300 series stainless-steel shelves. Front of counter shall have 18 ga. stainless steel double pan NSF hinged keyed alike doors. Table shall be supported by a one-piece laser cut galvanized channel underbracing and supported by 5” dia. swivel casters with brakes Provide counter with 1/8” thick sound deadening

Utilities: Refer to FSE Rough-in Drawings.
Acceptable Alternates: LTI
Note: All custom fabrication shall be from one manufacturer.

ITEM # 150 CONDIMENT DIDSPENSERS

Quantity: Two (2)

By Owner

END OF ITEMIZED SPECIFICATIONS

1.0 - GENERAL

1.1 Section Includes

A. Four-face electronic scoreboard Model 2665 -4 and control console for indoor use.

B. Single-face electronic scoreboard Model 2350 and control for indoor use.

C. Accessories for both models.

1.2 References

A. Standard for Electric Signs, UL-48, 14th Edition.

B. Standard for Control Centers for Changing Message Type Signs, UL-1433, 4th Edition.

C. Federal Communications Commission Regulation Part 15.

D. National Electric Code.

1.3 Submittals

A. Provide Scoreboard owner's handbook including drawings, sample warranty and other information needed for installation, operation, and maintenance of the scoreboard and accessories.

1.4 Quality Assurance

A. Source limitation: Provide all components including scoreboard, control console, data cable, mounting hardware, and other accessories from a single manufacturer for a complete and fully functional system.

B. Manufacturer qualifications: Require company specializing in manufacturing electronic scoreboards with a minimum of ten years experience.

C. Installation shall be done by manufacturer’s authorized installers.

D. Adherence to nationally recognized standards.
   1. ETL listed to UL Standards 48 and 1433.
   2. NEC compliant.
   3. FCC compliant.

E. For indoor use only.

1.5 Delivery, Storage, And Handling

A. Product delivered to installation site unless otherwise specified.

B. Scoreboard and accessories to be stored in a clean, dry environment.

C. Special precautions for the scoreboard face.

1. Each scoreboard section will be protected during shipment by a layer of cardboard or other sheet material. Avoid removing this protective sheet until the installation begins.

2. Never lay a scoreboard face down or stack other objects on a scoreboard lying on its back.

3. Avoid sliding objects (like another scoreboard) along the plane of the scoreboard face even if the protective sheet is in place. This can result in LEDs being sheared.

1.6 Project Conditions

A. Scoreboard and accessories should not be installed until the area has been made weatherproof.

B. The architect shall determine location of scoreboard, control console, and other accessories.

C. The Installing Contractor shall be responsible for making certain the placement of the scoreboard does not violate local building codes or league rules regarding overhead clearance or interfere with play on the court, visibility from the stands, or lighting.

D. The Installing Contractor shall verify that the mounting structure is capable of supporting the weight of the scoreboard, additional panel, and other accessories.

E. The scoreboard location requires four standard grounded 120 VAC electrical outlets.

F. The control console location requires one standard grounded 120 VAC electrical outlet.

1.7 Warranty

A. Five year limited warranty includes factory labor and material costs for repairing or replacing defective parts. Provide sample of the warranty document with shop drawing submittal.

B. Warranty coverage period shall be effective from Date of Substantial Completion.

1.8 Maintenance

A. Replacement parts and factory repair options available from manufacturer.

B. Product support provided by experienced technicians and online documentation available via phone, web, and email at no cost to customer.

2.0 - PRODUCTS

2.1 Manufacturer

A. Basis of Design - Electro-Mech Scoreboard Co.

2.2 Scoreboards

A. Provide two (2) wall mounted Model 2350 scoreboard units as indicated for Gymnasium A111 as indicated.

1. Functions and Features: Model 2350 Indoor Scoreboard is designed to present information pertinent to basketball, volleyball, wrestling and other indoor sports. This scoreboard unit shall be provided to interface and operate in conjunction with other scoreboard units located within the same gymnasium. Presentation on each face includes:
   a. Four-digit Clock with illuminated colon/decimal indicator that can count up in MM:SS format, count down in MM:SS or SS.T format, or show time of day in HH:MM format. Clock digits are 12 inches tall and made from red LEDs.

   b. Guest and Home Scores to 199. Score digits are 12 inches tall and made from amber LEDs.

   c. Period to 9. The Period digit is 9 inches tall and made from green LEDs.

   d. Guest and Home Bonus indicators made from green LEDs.

   e. Guest and Home Next Possession indicators made from red LEDs.

   f. Integrated Horn

   g. Two dedicated 120 VAC outputs for optional visual horn indicators.
   h. One data output for daisy chaining additional scoreboards or shot clocks. Typically the four scoreboard sections are synchronized by bringing data cable from the console to the data input jack one section, running a provided jumper cable from the data output jack of that scoreboard section to the data input jack of the next scoreboard section, and so on until all four sections are connected.

2. Cabinet Size
   a. Standard model (with no side ID panel): 9 feet wide, 35 inches tall, 6 inches deep.

   b. With optional ID panel on left: 12 feet wide, 35 inches tall, 6 inches deep.

   c. With two optional ID panels (left and right): 15 feet wide, 35 inches tall, 6 inches deep.

   3. Cabinet Weight (of each scoreboard section).
   a. Standard model (with no side ID panel): 85 pounds.

   b. With optional D panel on left: 100 pounds.

   c. With two optional ID panels (left and right): 115 pounds.

2.3 Accessories

A. Standard Accessories to be provided for Model 2350

1. Control Console.

a. Supports all features of Electro-Mech 2000 series basketball scoreboards without the need to enter codes or other information to configure the device. Player stat panels require separate custom control consoles.

b. Provides direct data outputs for up to four scoreboards and shot clocks all synchronized to the data (including the time) generated by the control console. Additional displays may be controlled in synchronization by daisy chaining from the data outputs of scoreboards connected to the control console.

c. Constructed of a heavy-duty ABS plastic housing holding a 0.1-inch thick keypad panel with stainless steel metal dome switches that provide tactile feedback and are rated for one million actuations.

d. Requires one standard grounded 120 VAC electrical outlet.

2. Extension Cables: 10-foot long shielded data cable with male stereo connectors at each end allows control console to be connected to a junction box (or ScoreLink transmitter) at the point of operation and later unplugged for storage.

3. Junction Box: Provides a point of termination for the data cable with a stereo socket for quick connection to the control console.

4. Stereo Plug With Pigtail: Provides a connector to be spliced onto the data cable at the scoreboard end.

5. Mounting hardware: The scoreboard cabinet is shipped with two keyhole plates attached to the top rear frame designed to allow the scoreboard to be suspended from lag bolts mounted in the wall. Two eyebolt mounted in the top of the frame may be used to lift the scoreboard cabinet and may also provide a permanent attachment points for suspension cables.

B. Other Accessories to be provided:

1. Data Cable: A shielded two-conductor cable with a drain line is the typical means of providing a path for data from the control console to the scoreboard.

2. ID Panels: This scoreboard may be ordered with an ID panel integrated into the cabinet on the left side or with two integrated panels flanking the scoreboard. An additional panel shipped as a separate cabinet, may be added along the bottom. These panels may be purchased blank or with simple text, multi-colored text and graphics, or screen-printed processed-color logos applied to their faces.

3. Carrying Case For Control Console: Included with the ScoreLink system, this option is also available for scoreboards with hard-wired data cables.

4. Handheld Clock Start/ Stop Control: Provides a hand-held pendant that allows the clock operator to start and stop the Game Clock without touching the control console.

5. Visual Horn Indicators: Designed to illuminate whenever the scoreboard horn sounds. These indicators must attach to receptacles provided on the scoreboard cabinet.

6. Team Name In Place of "HOME".

2.4 Finish

A. Standard scoreboard faces, digit masks, and the exposed areas of the corner pieces are coated with low gloss black polyester resin paint for maximum contrast and resistance to scratches.
   1. Baked on automotive grade low gloss paint in a selection of standard colors is available from the manufacturer for the scoreboard faces and corners.

   2. Non-standard colors and finishes may be applied to the scoreboard faces and corners at the customer's request.

B. Scoreboard and corner framing and back are mill-finished aluminum.

C. Captions and other decorative elements on the face of the scoreboard are vinyl.

2.5 Source Quality Control

A. Provide the following Tests and Inspections.
   1. Manufacturer requires sub-contracted printed circuit board subassemblies to undergo functional testing at the point of manufacture.
   2. Manufacturer inspects incoming components prior to installation in scoreboard and accessories.

   3. Manufacturer functionally tests major electrical subcomponents prior to installation in scoreboard and accessories.

   4. Manufacturer inspects and tests scoreboards and accessories at full power prior to shipment.

   5. Manufacturer performs a test assembly on all scoreboard sections and corner sections prior to packaging to ensure proper fit.

3.0 - EXECUTION

3.1 Examination

A. Verify 120 VAC outlets at scoreboard and control console locations are properly grounded.

B. If data cable is used, verify continuity from scoreboard to control console locations.

C. Verify data cable and AC power cable are not run in the same conduit or wire tray.

D. Verify data cable and AC power cable are secure and run in conduit where they might be exposed to abuse or where local, state, or national codes require.

E. Verify location of scoreboard, junction box (or boxes), and accessories with customer.

F. Test each scoreboard section and control console by attaching units to power and plugging console output into scoreboard data input prior to hanging the complete assembly.

3.2 Installation

A. Installing Contractor shall install scoreboards in accordance with Manufacturer's written installation instructions.

B. Scoreboard Manufacturer's representative shall provide training to Owner's representative(s) to demonstrate proper operation and maintenance of scoreboards and accessories.

C. Installing Contractor shall remove all packaging materials and other installation related debris from site upon completion of installation.

3.3 Close Out Procedures

A. Provide three (3) sets of Operating and Maintenance Manuals along with (3) copies of Manufacturer's Warranty. See Section 01910.

3.4 Protection (Post Installation)

A. The most common sources of damage to scoreboards and accessories are electrical surges running through power or data connections. The usual causes are lightning, power equipment problems (floating neutrals, bad transformers, etc.), and improper connections. To minimize these problems:

1. Ensure electrical wiring is properly grounded.

2. Unplug control console from power outlet and from data cable when not in use.

3. Turn off the breaker to disconnect scoreboard from power when not in use.

4. Label scoreboard data cable junction box and all connectors near junction box, scoreboard, and accessories so that public address systems and other devices with similar connections are not accidentally plugged into the scoreboard.

5. Avoid loss or damage of control console, extension cable, and other accessories by storing when not in use.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work of this section consists of furnishing and installing complete, all miscellaneous furnishings and fixture items as indicated.

1.2 Submittals
Shop drawings shall be submitted.

1.3 Warranty
Provide Manufacturer's Standard Warranty where manufacturer warrants that the Goods delivered hereunder shall be of the kind described within this agreement and free from defects in material and workmanship under conditions of normal use for a period of six (6) years. Halotron, CO2 and Water/Water based extinguisher will be warrantied for a period of five (5) years.

2.0 - PRODUCTS

2.1 Fire Extinguisher Cabinets (FEC)
Recessed or semi-recess U.L. approved baked enamel 18 gauge steel cabinet, 24" h. x 10-1/2" w. x 6" d. with 2-1/2" trim. Cabinet door to be baked enamel or epoxy coated with stencil lettering "Fire Extinguisher" equal to J. L. Industries-Panorama #1017 Identity Q horizontal, white w/red letters - type break glass w/cly. lock; Larsen's Mfg. Co.; Amerex Corporation; or approved equal.

Provide comparable fire rated fire extinguisher cabinets in fire rated walls as per rating indicated.

2.2 Fire Extinguisher (FE)

A. Cabinet Mounted - U.L. approved, 10 pound, tri-class dry chemical for Class A, B, & C fires. Equal to J. L. Industries - Cosmic 10E with hose; Larsen's Mfg. Co.; Amerex Corporation. Provide one with each cabinet.

B. Wall Mounted - 10 pound, Tri-Class Dry Chemical for Class A, B, C fires, U.L. approved, Model 10 ABCS-1. Manufacturers: J.L. Industries, Larsens, Amerex Corporation.

C. Provide "K" type fire extinguishers at all kitchen locations.

3.0 - EXECUTION

3.1 Installation
Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, ADA and approved details.

3.2 Fire Extinguishers shall be cabinet mounted in areas as indicated. Height shall be 4' from floor to extinguisher handles.

3.3 Fire Extinguishers shall be wall mounted in areas as indicated or required so that distance of travel between units does not exceed 75 feet. Each separate area shall have a minimum of one unit. Mounting height shall be 4' from floor to handle.

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work of this section consists of furnishing and installing complete, all miscellaneous furnishings, fixtures, and signage items as indicated.

1.2 Existing Conditions

A. It is the general contractor's responsibility to field verify existing signage before a bid and provide signage that shall match all existing signage types and styles currently installed to provide a continuity of design to the owner as required.

1.3 Submittals

Shop drawings shall be submitted.

2.0 - PRODUCTS

2.1 Building Letters

A. Cast aluminum letters, equal to Leeds Architectural Letters, Inc., Select from all available fonts Size: As indicated on drawings, lay-out as indicated. Colors as selected by Architect. Provide flush concealed stud mounting.

2.2 Building Plaque

A. Dedication plaque shall be of cast aluminum. Furnish and install a 24" x 42" plaque with approximately 500 raised letters and raised border. Field shall have stipple finish. Face of letters and borders shall have ground satin finish surface.

B. Plaque layout and designation shall be furnished by the Architect.

2.5 Appliances

A. **Commercial Washer and Dryer (Heavy Duty)** - Provide at locations as indicated on drawings. Washer equal to Milnor - Rigid Mount 30015VRJ. Dryer equal to Milnor M758V (Electric). Provide all utility rough-ins and final hook-up in accordance with the manufacturer's written instructions. (See cut sheets at the end of this section).

1. See Electrical/Plumbing drawings and provide equipment with all required electrical and plumbing rough-ins, hook-ups, and installations.
2. Warranty: Provide manufacturer's 5-year warranty.
3. Provide Operation/Maintenance Demonstration for Owner.

B. Washer/Dryer (Standard)

1. **Washer:** Speed Queen -TR5 Product #TR5000WN; Model # AWN63RSN115TW01, 3.2 cu. ft.
2. **Dryer:** Speed Queen - DR5 Product # DRS000WE; Model # ADE4BRGS175TW01; Electric
3. See Electrical/Plumbing drawings and provide equipment with all required electrical and plumbing rough-ins, hook-ups, and installations.
4. Warranty: Provide manufacturer's 5-year warranty.
5. Provide Operation/Maintenance Demonstration for Owner.

2.6 KnoxBox

Provide one Standard Capacity Model 3274 KnoxBox 3200 - Location as directed by the Architect
Color: Black

Mount Type: Standard Mount
Tamper Switch Type: None

2.7 Chemical Toilet
Provide Serene Life Portable Toilet (s) SLCATL320 or pre-approved equal as required in the Storm Shelter. Provide Maintenance and Instructions with Closeouts.

2.8 Project Sign - Specification requirements are listed in Section 01030.

3.0 - EXECUTION

3.1 Installation
Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, and approved details.

3.2 Installation of Building Letters
Install building letters on surfaces and at heights as directed. Install in accordance with manufacturer’s recommendations.

3.3 Installation of Plaque(s)
Install plaque(s) where directed.

3.4 Installation of Appliances
Install appliances as directed. Install in accordance with manufacturer’s recommendations.

END OF SECTION

1.0 – GENERAL

1.1 Section Includes

A. Fixed modular laminate clad casework and components.

B. Countertops.

C. Mobile storage units, tables and components.

1.2 Related Sections

A. Blocking within walls where indicated: Division 6.

B. Millwork, trim, and custom cabinetry: Division 6 and 12.

C. Glass: Division 8.

D. Base molding: Division 9.

E. Sinks and service fixtures, service waste lines, connections, and vents: Division 15.

F. Electrical service fixtures: Division 16.

1.3 Quality Assurance

A. Manufacturer: Minimum of 5 years' experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.

B. Manufacturer: Provide products certified as meeting or exceeding ANSI-A 161.1-2000 testing standards.

C. All manufactured casework systems, countertops and related items herein specified shall be furnished by one contractor to insure single source responsibility, and integration with other building trades.

1.4 Submittals

A. Comply with Section 01350, unless otherwise indicated.

B. Product Data: Manufacturer's catalog with specifications and construction details.

C. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.

1. Include production drawings for all casework systems and section drawings of all casework, work surfaces and accessories.

2. Indicate locations of plumbing and electrical service field connection by others.

3. Include layout with units in relation to surrounding walls, doors, windows, and other building components.

4. Coordinate production drawings with other work involved.

D. Casework Samples:
1. Component samples: Two sets of samples for each of the following: Decorative laminate color charts / PVC and ABS edgings.

1.5 Product Handling

A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed, store in ventilated place, protected from the weather, with relative humidity range of 25 percent to 55 percent.

B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

C. General Contractor shall be responsible for protection of all casework and tops after installation is complete.

1.6 Job Conditions

A. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least 1 week.
1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.

2. After installation, control temperature and humidity to maintain relative humidity between 25 percent and 55 percent.

B. Conditions: Do not install casework until interior concrete work, masonry, plastering and other wet operations are complete.
1. Flooring required to be placed under casework and equipment must be installed prior to installation.

2. Wood or metal blocking (wall grounds) shall be installed within partitions prior to delivery of casework and furnishings to allow for immediate installation on delivery.

3. Walls and openings shall be plumb, straight and square. Concrete floors shall be level within acceptable trade tolerances. Specifically the floor must be within 1/8" of level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.

4. All overhead mechanical, electrical or plumbing rough-in work shall be complete

5. Ceiling grids (with or without ceiling tiles), overhead soffits, duct work and lighting shall be installed.

6. Painting shall be complete.

7. General Contractor shall provide a secure storage area within the building that is clean, dry, well ventilated, protected from direct sunlight and broom clean.

1.7 Warranty

All materials and workmanship covered by this section will carry a five (5) year warranty from date of acceptance.

2.0 – PRODUCTS

2.1 Manufacturers:

A. Manufacturer:
Casework shall be Stevens, Advanced Cabinet Systems or pre-approved equal. Each manufacturer must be able to provide casework (including selected plastic laminate colors) as specified and detailed in drawings and specifications.

B. Substitutions:

1. Casework of other manufacturers will be considered for pre-approval, providing written request is received and approved at least ten (10) days prior to announced bid date and approved by Addendum. Bidder shall state in writing any deviations from requirements and specifications. The casework shall conform to the configuration, arrangement, design, material quality, joinery, panel thickness, and surfacing of that specified and shown on drawings.

2. Manufacturer must be Architectural Woodwork Institute (AWI) Premium Certified.

3. Requests for product substitutions must comply with Section 01360 – Product Substitution Procedures.

2.2 Materials

A. Core Materials:

1. Particleboard up to 7/8 inch thick: Industrial Grade average 47-pound density particleboard, ANSI A 208.1-1999, M-3.

2. Particleboard 1 inch thick and thicker: Industrial Grade average 45-pound density particle-board, ANSI A 208.1-1999, M-2.

3. Medium Density Fiberboard 1/4 inch thick: Average 54-pound density grade, ANSI A208.2.

4. MR Moisture Resistant Particleboard: Average 47-pound density particleboard, ANSI A208.1 1-1999, M-3.

B. Decorative Laminates: GREENGAURD Indoor Air Quality Certified

1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-2005.

2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-2005.

3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-2005.

4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-2005.

5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-2005.

6. Thermally fused melamine laminate, NEMA Test LD 3-2005, color to be selected by architect.

C. Laminate Color Selection: Nevamar, Wilson Art, Formica, Laminart, Arbonite, and Pionite are approved manufacturers. Manufacturer, colors, and pattern shall be selected from premium grade laminate and indicated on finish legend and schedule.

D. Edging Materials:
1. 1mm PVC banding, machine applied; match laminate as schedule
2. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius; match laminate as scheduled

E. Glass:
1. Wall unit full sliding glass doors: 1/4 inch thick laminated safety glass.

2. Glass insert doors, hinged or sliding wall cabinets: 1/4 inch thick laminated safety glass.

3. Glass insert doors, hinged or sliding tall or base cabinets. 1/4 inch thick laminate safety glass.

4. Sliding doors mounted in aluminum track.

5. Trim glass inserts: Extruded rigid PVC channel and self-locking insert retainer strip.

2.3 Specialty Items

A. Support Members:
1. Countertop support brackets: Epoxy powder coated, 11 gauge steel with integral cleat mount opening and wire management opening.

2. Undercounter support frames: Epoxy powder coated.

3. Legs: Epoxy powder coated.

4. Brackets must support minimum of 600 lbs. without use of cross brace.

B. Tote Trays:
1. Heavy-duty vacuum-formed polypropylene plastic with full top rim and pull. Trays are ivory color, equipped with label holder.

2. Tote tray/supply cabinets equipped with injection molded polycarbonate; continuous side rail support glide. Each side rail support glide is adjustable with integral support pins to interface 32mm pre-drilled holes.

C. Mobile Storage Units:
1. Tall mobile storage units, as indicated on the drawings, are structural steel framed with epoxy powder coated tubing.

2. Casters: 5 inch soft rubber double ball bearing, heavy gauge steel fork, zinc plate finish with 2 brakes per unit. Load capacity per caster to be a minimum of 200 pounds.

3. Side panels, back, top, drawer fronts, and doors are of 3/4 inch thick particleboard, laminated on the exterior with high pressure decorative laminate VGS and on the interior with high pressure CLS cabinet liner. Exposed edges are PVC banding, 1mm or 3mm thickness, to match adjacent casework.

4. Low mobile storage units are mounted to a caster base.

D. Computer Keyboard
Equal to HumanScale Model Number**:** 6G90090F22 with Tilt adjustment range: 0o to -15o. Exceeds BIFMA standards. Made primarily of powder-coated steel 15-year warranty. Keyboard Platform Made of *1⁄4*” phenolic resin

Available with Technogel or foam palm supports; as indicated on drawings.

2.4 Cabinet Hardware

A. Hinges:

1. 120 degree concealed hinge.
   a. Doors 48 inches and over in height have 3 hinges per door.
   b. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.
   c. Finish to be selected by Architect.
   d. location for installation shall be noted on schedules on the drawings.

2. 270 degree five knuckle - epoxy powder coated, institutional grade, 2-3/4-inch overlay type with hospital tip. 0.095 inch thick. ANSI-BHMA standard A156.9, Grade 1.
   a. Doors 48 inches and over in height have 3 hinges per door.
   b. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.
   c. Finish to be selected by Architect.
   d. location for installation shall be noted on schedules on the drawings.

B. Pulls:

One pull shall be: located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life. Pull design shall comply with the Americans with Disability Act (ADA). Finish to be selected by Architect.

   a. Anodized aluminum wire pull, 8mm diameter with 96mm O.C. mounting holes

C. Drawer Slides:

1. Regular, knee space and pencil: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.

2. File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

D. Adjustable Shelf Supports:

1. Injection molded transparent polycarbonate friction fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support has 2 integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support automatically adapts to 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.

E. Locks:

1. Removable core, disc tumbler, cam style lock with strike. Lock for sliding 3/4 inch thick doors is a disc type plunger lock, sliding door type with strike. Lock for sliding glass/acrylic doors is a ratchet type sliding showcase lock.

2. Keying:

   a. Alike Per Room & Master (100 maximum combinations)

3. Elbow catch or chain bolt used to secure inactive door on all locked cabinets.

F. Sliding Door Track: Anodized aluminum double channel.

G. Coat Rods: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.

H. File Suspension System: Extruded molding integral with top of drawer box sides to accept standard hanging file folders.

I. Mirrors: 1/4 inch thick polished mirror plate.

2.5 Fabrication:

A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown. Tall Cabinets: All wardrobe cabinets are to be to be 29” deep unless noted otherwise on architectural drawings

B. All casework panel components must go through a supplemental sizing process after cutting, producing a panel precisely finished in size and squared to within 0.010 inches, ensuring strict dimensional quality and structural integrity in the final fabricated product.

C. Cabinet Body Construction:

1. All cabinet body construction shall be secured utilizing concealed interlocking mechanical fasteners. Construction must meet requirements in the AWS Manual, Edition 2, including errata through 2016 and appendix section.

a. Tops, bottoms and sides of all cabinets are particleboard core.

b. Tops, bottoms and sides of sink base units are moisture resistant particleboard core.

c. Sink Base Countertop substrate shall be 3/4" MR particleboard. Which shall run entire length of sink base unit. Joints or breaks at sink opening shall not be accepted. If necessary breaks shall only be allowed 4’ to the right or left of the centerline of the drain.

2. Cabinet backs: Minimum 1/4 inch thick particle board core (maximum of 1/2 inch thick particle board)

a. Exposed back on fixed: 3/4 inch thick particleboard with the exterior surface finished in VGS laminate as selected.

b. Exposed back on fixed: 3/4 inch thick moisture resistant particleboard with the exterior surface finished in VGS laminate as selected.

3. Cabinet base and tall units shall have a site-built toe base, constructed of 3/4-inch (minimum) lumber unless otherwise shown on the drawings. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawings.

4. Base units, except sink base units: Full sub-top. Sink base units are constructed of 3/4 inch moisture resistant particleboard and the base shelf shall be laminated both sides with cabinet liner.

5. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.

6. Exposed and semi exposed edges.
Edging: 1mm PVC.

7. Adjustable shelf core: 3/4 inch thick particleboard up to 36 inches wide, 1 inch thick particleboard over 36 inches wide.
Front edge: 1mm PVC.

8. Interior finish, units with open Interiors: (exposed areas)

   a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces that are exposed to receive thermally fused melamine to match exterior laminate.

   b. Laminate color to be selected by architect.

9. Interior finish, units with closed Interiors:

   a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine to match other laminate.

   b. Laminate color to be selected by architect.

10. Exposed ends:
Faced with VGS high-pressure decorative laminate.

11. Wall unit bottom:
Faced with thermally fused melamine laminate. (non-exposed areas only)

12. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.

13. All wardrobe cabinets are to be 29” deep unless noted otherwise on architectural drawings

D. Drawers:

1. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 3mm PVC.

2. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.

3. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with thermally fused melamine. Minimum 1/2 inch thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.

E. Door/Drawer Fronts:

1. Core: 3/4 inch thick moisture resistant particleboard at sink units.

2. Provide double doors in opening in excess of 24 inches wide.

3. Faces:

a. Exterior: VGS High-pressure decorative laminate.

b. Interior: High-pressure cabinet liner CLS.

c. All exposed areas to receive matching laminate color as face.

4. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

F. Miscellaneous Shelving:

1. Core material: 3/4 inch or 1 inch thick particleboard.

2. Exterior: VGS High-pressure decorative laminate.

3. Edges: 3mm PVC (at open storage shelving on metal standards), external edges and outside corners machine profiled to 1/8 inch radius.

2.6 Decorative Laminate Countertops:

A. All laminate clad countertops shown on drawings for fixed casework shall be constructed with minimum 1-1/6"" solid particleboard, except at sink and wet areas.
Furnish plywood core tops and splashes, two and a half feet each side of center line of all sinks. All tops shall be laminated on the top face with GP50 (.050) high pressure decorative laminate and shall also have BK20 backer sheet creating balanced construction. The plastic laminate tops required for the rail mounted casework shall be constructed the same as the fixed laminate tops in the lengths indicated on the drawings. The rail mounted tops mounted over brackets shall be 1-1/4 inches from the wall to create a continuous grommet behind the back of the top. The rail mounted tops shall be supplied with 3mm PVC on all four edges. Provide tight joint fasteners where needed. All exposed edges, including edges of backsplash where used, shall have 3mm PVC banding, machine applied with waterproof hot melt adhesive. Exposed edges and corners shall be machine profiled to 1/8" radius for safety. Edging shall be available in colors as listed in Specification. Furnish 4" high backsplashes behind all sinks and as indicated on architectural drawings.

3.0 - EXECUTION

3.1 Inspection

The casework contractor must examine the job site and the conditions under which the work under this section is to be performed, and notify the building owner in writing of unsatisfactory conditions. Do not proceed with work under this Section until satisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 Preparation

Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.3 Installation

A. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.

B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind.

C. Repair minor damage per plastic laminate manufacturer's recommendations.

3.4 Cleaning

A. Remove and dispose of all packing materials and related construction debris.

B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil etc., in preparation for final cleaning by the building owner.

3.5 Color Selection:

Laminate Color Selection: See Finish Legend and Schedule for color selections.

END OF SECTION

1.0 – General

1.1 Scope

A. Furnish and install 1” Mini Horizontal Aluminum Blinds (Premium Quality)

B. Related Work Specified Elsewhere:

1. Section 06100: Rough Carpentry
2. Section 08570: Aluminum Windows

1.2 References

A. Flame-Resistant Materials Shall Pass Or Exceed One Or More Of The Following Tests:

1. National Fire Protection Association (NFPA) 701 (small scale for horizontal applications)
2. Department of Transportation Motor Vehicle Safety Standard 302 Flammability of Interior Materials
3. California Administrative Code Title 19
4. Federal Standard 191 Method 5903

1.3 Submittals

A. Product Data: Manufacturer’s descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers’ recommendations for maintenance and cleaning shall be included.

B. Drawings And Diagrams: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.

C. Sample: Submit one sample shade of each type specified for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.

1.4 Quality Assurance:

A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.

B. Installer: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.

C. Provide 1” Mini Horizontal Aluminum Blinds of only one manufacturer for entire project.

1.5 Delivery, Storage And Handling:

A. Product shall be delivered to site in manufacturer’s original packaging.

B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.

1.6 Job Conditions:

A. Prior to shade installation, building shall be enclosed.

B. Interior temperature shall be maintained between 60° F. and 90° F. during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

1.7 Warranty:
Lifetime Limited Warranty. Specific product warranties available from manufacturer or its authorized agent.

2.0 – PRODUCTS

2.1 Acceptable Manufacturer

A. Product: Hunter Douglas “CD60 1” Mini Aluminum Blind”, or pre-approved equal.

B. Materials:

1. SLATS: 1” wide x .006” thick prior to painting, heat-treated and spring tempered (except 5000 series alloy on metallized finishes) aluminum alloy 6011 with eased corners and manufacturing burrs removed. Furnish not less than nominal 15.2 slats per foot to ensure tight closure and light control. Finish with manufacturer’s standard baked-on finish in colors selected by architect from manufacturer’s available contract colors utilizing Dust Shield™ finish to inhibit dust build-up for easier maintenance.

2. SLAT SUPPORT: Braided ladders of 100% polyester yarn color compatible with slats and spacing of ladder no more than 20mm.

3. HEADRAIL: U-shaped profile with rolled edges, measuring 1 3/8” x 1 3/8” x .024” constructed of corrosion resistant steel and providing a sleek beveled edge valance-free design. Internally fit with components required for specified performance and designed for smooth, quiet, trouble-free operation. Headrail finish to be standard baked-on polyester and to match slats. Ends fitted with .024” steel end lock with adjustable tab for centering blinds.

4. BOTTOM RAIL: Steel, with corrosion-resistant finish formed with double-lock seam into closed oval shape for optimum beam and torsional strength. Ends fitted with color-coordinated engineered polymer caps. Color-coordinated engineered polymer tape buttons secure the ladder and cord. Bottom Rail finish to be standard baked-on polyester color coordinated to slats.

5. LIFTING MECHANISM: Cordless

6. TILTING MECHANISM: Permanently lubricated die-cast worm and gear type tilter gear mechanism in fully enclosed housing with clutch action to protect ladder tapes from over rotation of the solid steel, corrosion resistant tilt rod.

7. TILT CONTROL WAND: Tubular shaped 7/16” diameter extruded clear plastic, ribbed for positive grip and detachable without tools. Located on either side of individual blind unit as per architect’s request.

8. MOUNTING HARDWARE: Manufacturer’s standard .042” steel box brackets with baked-on polyester finish to match headrail with additional support brackets for blinds over 60” wide.

2.2 Fabrication

A. Blind measurements shall be accurate to within + 1/8” or as recommended in writing by manufacturer.

2.3 Finishes

A. Slat finish color to be selected by the Architect.

B. Slat Support braided ladders shall be color coordinated with slat.

3.0 - EXECUTION

3.1 Inspection:

A. Contractor shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.

B. Other Interacting Trades shall receive drawings of shade systems, dimensions, assembly and installation methods from contractor upon request.

3.2 Installation:

A. Installation shall comply with manufacturer’s specifications, standards and procedures as detailed on contract drawings.

B. Adequate Clearance shall be provided to permit unencumbered operation of shade and hardware.

C. Clean finish installation of dirt and finger marks. Leave work area clean and free of debris.

D. Mini-Blinds shall be installed inside of the window frame unless otherwise directed by Architect. Noted as WB – Window Mini Blinds.

3.3 Demonstration:

A. Demonstrate operation method and instruct owner’s personnel in the proper operation and maintenance of the blinds.

END OF SECTION

1.0 - GENERAL

1.1 SUMMARY

A. Section Includes: Telescopic Gym Seating includes electrically operated multiple-tiered seating rows comprising of seat, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing or for moving purposes.

1. Wall-attached telescoping stands

B. Related Sections:

1. Retain those sections below which cross reference information related to this section in project manual.
2. Section 012100 "Allowances" for allowances in the contract for telescoping stands.
3. Section 012300 "Alternates" for alternate products.
4. Section for floor finishes adjacent to telescoping stands.
5. Section for wall finishes adjacent to telescoping stands.
6. Division 26 Electrical sections for electrical wiring and connections for electrically operated telescoping stands.

1.2 REFERENCES

A. Aluminum Association (AA):

1. ADM 1- Aluminum Design Manual

B. American Institute of Steel Construction (AISC):

1. AISC 360- Steel Construction Manual.

C. American Iron & Steel Institute (AISI):

1. AISI S100 – Design of Cold Formed Steel Structural Members.

D. American Society for Testing Materials (ASTM):

1. ASTM - Standard Specifications for Properties of Materials.

E. American Wood Council (AWC):

1. ANSI/AWC NDS (National Design Specification for Wood Construction).

F. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code – Steel
2. AWS D1.3 Structural Welding Code - Sheet Steel

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each telescoping stand unit according to ICC 300.

B. Manufacturer's System Design Criteria:

1. Gymnasium seat assembly; Design to support and resist, in addition to its own weight, the following forces:

a.) Live load of 120 lbs. per linear foot (1.75 kN/m) on seats and decking

b.) Uniformly distributed live load of not less than 100 psf (4.79 kN/m2) of gross horizontal projection.

c.) Parallel sway load of 24 lbs. per linear foot (0.35 kN/m) of row combined with (b.) above

d.) Perpendicular sway load of 10 lbs. per linear foot (0.15 kN/m) of row combined with uniformly distributed live load above.

e.) Parallel and Perpendicular sway loads are not applied concurrently.

2. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:

a.) Concentrated load of 200 lbs. (0.89 kN) applied at any point and in any direction.

b.) Uniform load of 50 lbs. per foot (0.73 kN/m) applied in any direction.

3. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:

a.) Concentrated load of 200 lbs. (0.89 kN) applied at any point and in any direction along top rail.

b.) Uniform load of 50 lbs. per foot (0.73 kN/m) applied in any direction at top rail

c.) Uniform load of 50 lbs. (0.22 kN) applied on an area equal to 1 ft2 (0.09 m2) applied on all guardrail infill panels.

1.4 ACTION SUBMITTALS

A. Product to be supplied shall have a current evaluation report issued by ICC Evaluation Services (ICC-ES) certifying that it meets all structural design requirements of the current ICC 300 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, including all specified load combinations.

B. Provide Current Welding Certification[s] AWS or CSA.

C. Provide Manufacturers Certification of Insurance coverage of not less than $5,000,000 and Errors and Omission Insurance of not less than $2,000,000

D. Provide Installer Name, Current Certification Number and Product Qualifications

E. Provide Manufacturers' standard warranty documents.

F. Shop Drawings: For telescoping stands in both stacked and extended positions. Show seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types and finishes.

1. Electrical: Indicate power supply requirements.

2. Graphic Drawing Proofs & Layouts

G. Samples: For units with factory-applied finishes.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For telescopic bleacher operations manual.

1.6 QUALITY ASSURANCE

A. Manufacturer shall be a current Certified Welding Fabricator as defined by either AWS or CWB, or both. The manufacturer shall comply with structural welding codes that are applicable to their products or materials. These welding codes shall be produced by AWS or CSA

B. Product to be supplied shall have a current evaluation report issued by ICC Evaluation Services (ICC-ES) certifying that it meets all structural design requirements of the current ICC 300 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, including all specified load combinations.

C. Electrical components, devices, and Accessories shall be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.

D. Installer Qualifications: Factory trained and certified by the manufacturer.

E. Seating Layout: Provide telescoping stands to comply with ICC 300 <Insert year> Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, except where additional requirements are indicated or imposed by authorities having jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver telescoping stands in manufacturers packaging clearly labeled with manufacturer name and content.

B. Handle bleacher equipment in a manner to prevent damage.

C. Deliver the telescoping stands at a scheduled time for installation that will not interfere with other trades operating in the building when at all possible.

1.8 PROJECT CONDITIONS

A. Field Measurements: Coordinate actual dimensions of construction affecting telescoping stands installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.9 WARRANTY

A. Manufacturer's Warranty: Includes the repair or replacement of the defective product; or defective component thereof, with a comparable product; or component thereof, or a refund of the purchase price prorated over the warranty period.

1. Includes: Labor, materials, and freight for replacement or repairs.

2. Structural Component parts of Understructure Warranty Period: [10 years] from Date of Acceptance

3. Decking systems, seating collections, electrical, portable and integral dolly systems, end closure curtains, surface material finishes Warranty Period [5 years] from Date of Acceptance.

2.0 - PRODUCTS

2.1 GENERAL

A. Wood:

1. Lumber: NIST PS 20, southern pine complying with SPIB's "Standard Grading Rules for Southern Pine Lumber" for B&B Finish (B and better) grade-of-finish requirements.

2. Plywood: NIST PS 1, APA-grade trademarked, A-C grade.

B. Steel:

1. Structural-Steel Shapes, Plates, and Bars: ASTM A36.

2. Galvanized-Steel Sheet: ASTM A653, Grade 40 (276 MPa) coating designation G60.

3. Uncoated Steel Strip; Non-Structural Components: ASTM A1011, Commercial Quality, Type B, Hot-Rolled Strip.

4. Uncoated Steel Strip; Structural Components: ASTM A1011 Grade 33 (228 MPa), Grade 36 (249 MPa), Grade 40 (276 MPa), Grade 45 (311 MPa), or Grade 50 (345 MPa), Structural Quality, Hot-Rolled.

5. Galvanized Steel Strip: ASTM A653 Grade 40 (276 MPa) or Grade 64 (441 MPa), structural quality, coating designation G60.

6. Tubing: ASTM A500, cold formed; Grade B, or ASTM A513, 46 ksi min yield.

C. Polyethylene Plastic: High-density polyethylene; injection molded, color-pigmented, textured, impact-resistant, and dimensionally stable.

2.2 MANUFACTURERS

A. Manufacturer: Hussey Seating Company, U.S.A.

1. Product: MAXAM Telescopic Gym Seat System.

2. Other manufacturers seeking approval must submit product information and comply with Section 01360 - Product Substitution. Information must be received by Architect at least 10 days prior to bid date.

2.3 TELESCOPING STANDS

A. Wall-Attached Telescoping Stands: Forward-folding system with the rear of the understructure permanently attached to the floor and to the rear wall. Rear wall provides structural support and must support loads imposed by the bleacher.

2.4 DIMENSIONAL AND OPERATIONAL CRITERIA

A. Dimensions:

1. Bank Length: 81’-6”.

2. Aisle Width: 2 at 3’-0” and 2 at 4’-6” each bank.

3. Number of Tiers: 12.

4. Row Spacing: 26 inches (660 mm).

5. Row Rise: 9-5/8 inches (244 mm).

6. Open Dimension: 25’-11 5/16”.

7. Closed Dimension: 3’-8”.

8. Overall Unit Height: 10’-3”.

9. Maximum Net Capacity; with Flex Row Fully Recovered: 1052.

B. Operation: Integral Power Select paragraph above or below

1. Integral Power: Pendant control unit.

a.) Limit Switches: Automatically stop integral power system when telescoping stands reach fully opened or closed positions.

2.5 SEATING

A. Polymer Seat System: Courtside Collection XC10.

1. Material: Gas assist injection-molded, 100 percent recyclable HDPE, high density polyethylene.

2. Module Size: 18 inches (457 mm)] long by 10 inches (254 mm) deep.

3. Module Load: Tested to 600 lbs. (2.67 kN).

4. Seat height range from deck to top of seat: 16-1/8 inches (410 mm).

5. Integrally molded end caps at aisle end locations.

6. Integrally molded recess pockets to accept seat number and row letters.

7. Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.

B. ADA Accessible Seating:

1. Locate first tier modular units to provide wheelchair-accessible seating at locations indicated on Drawings.

a.) Flex-RowTM: Provide first row modular recoverable seating units that can be closed to accommodate persons requiring ADA spaces (or any other temporary space needs) or opened for standard usage. Each Flex-Row unit shall have a handle for easy operation.

1.) Provide a black full-surround steel skirting with no more than ¾" floor clearance for safety and improved aesthetics.

2.) Provide a black injection molded end cap for the nose beam for safety and improved aesthetics.

3.) Provide a mechanical positive lock when the Flex-Row system is in both the open and closed position. Handle shall unlock the modular recoverable seating unit for operation.

4.) Flex-Row can be utilized with the full system in the open or closed position.

5.) Flex-Row modular units are designed to achieve multi-use front row seating to accommodate team seating, ADA requirements and facility specific requirements. Flex-Row units are available in modular units from 2 to 7 seats wide as well as full section widths.

2.6 RAILS, PANELS AND STEPS

A. Center Aisle Rails:

1. Auto-Rotating

a.) Provide single pedestal mount handrails [34 inches (864mm)] high with terminating mid rail. Permanently attached handrail shall rotate in a permanently mounted socket for rail storage. Rail shall automatically rotate, lock in the use position, unlock and rotate back to the stowed position as the gym seats open and close. Ends of the handrail shall return to the post, and not extend away from it. Rails having openings to avoid interference with closed decks are not acceptable

2. Material and Finish: Gloss powder coated steel.

3. Color: Black.

B. Skirt Panel: On 1st Row, provide galvanized steel front skirt panel to prevent players/objects from sliding underneath the first row.

C. Steps

1. Sure-Step (Flip-up Front Aisle Step): Permanently hinged to the front row to ensure availability and ease of operation. Two 3” diameter x ¾” wide non-marking front wheels are provided so that the system can be operated with the Sure-Step in the stored or deployed position. All edges coined, hemmed or radiused with front edge protective rubber bumpers. Abrasive-backed non-slip tread identifier on leading edge of nosing. For aisle widths greater than 6’-0”, two side by side hinged steps are provided.

2. Intermediate Aisle Steps: Fully enclosed, at each vertical aisle. Full radius end caps on all four edges. Adhesive-backed abrasive non-slip tread surface.

2.7 COMPONENTS

A. Decking

1. Plywood

a.) 5/8 inch (16 mm) thick AC grade tongue and groove Southern Yellow Pine with clear urethane, high gloss finish.

B. Understructure:

1. Finish: Rust-inhibiting black finish.

2. Hardware finish: Zinc-plated, Rust inhibiting black finish.

3. Posi-locks and other surfaces: Powder coated black, Rust inhibiting black finish.

4. Nose beam and Rear Riser beam: Nose beam shall be continuously roll-formed closed tubular shape of ASTM A653 grade 40 (276 MPa). Riser beam shall be continuously roll-formed of ASTM A653 Grade 64 (441 MPa). Nose and Riser beam shall be designed with no steel edges exposed to spectator after product assembly. Nose beam and riser beams are through-bolted fore/aft to deck stabilizers and frame cantilevers to create the deck structure.

5. Frame: The frames are welded assemblies (one left hand, one right hand per tier) comprised of the following components:

a.) Lower Track subassembly: ASTM A1011 Grade 50: Continuous Positive Interglide System (casterhorn) interlocks each adjacent frame casterhorn using an integral, continuous, anti-drift feature and captive interlock with adjustable row spacing at front to prevent separation and misalignment.

b.) Lower Track Wheels: 3 per frame Not less than [5 inches (127 mm)] diameter by [1-1/4 inches (32 mm)] with non-marring soft rubber face to protect wood and synthetic floor surfaces, with molded-in sintered iron oil-impregnated bushings to fit [3/8 inch (10 mm)] diameter axles secured with E-type snap rings.

1.) Option: up to 6 wheels per frame for load distribution

c.) Slant Columns: A500 Grade B, tubular shape.

d.) Cantilever Subassembly: Consists of ASTM A1011 Grade 50 nose connection plate, cantilever, and riser attachment plate welded together into a subassembly.

6. Lock system: Casterhorns at the end sections of powered banks (minimally), and manual sections, contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.

7. Sway Bracing: ASTM A653 grade 40 (276 MPa), tension members bolted to columns.

8. Deck Stabilizer: A1011 Grade 45, member through-bolted to nose and riser at three locations per section. Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment.

C. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.8 ELECTRICAL OPERATION SYSTEMS

A. Integral Power

1. Default operation shall be with a removable pendant control unit which plugs into seating bank for tethered operator management of stop, start, forward, and reverse control of the power operation. Other modes of operation are optional.

B. PF2: Furnish and install Hussey PF2, an integral automatic electromechanical powered frame propulsion system, to open and close telescopic seating.

1. Electrical - Seating Manufacturer shall provide all wiring within seating bank, including pendant control. Motors, housing, and wiring shall be installed and grounded in complete accord with the National Electrical Code. The control system shall operate at low voltage (24V). The electrical contractor shall perform all connections at and upstream of the equipment specified herein and ensure that supplied voltage drops no more than 4% below nominal where power connects thereto.

2. Each unit for PF2 is driven by a 1/2 horsepower, 1725 RPM motor.

a.) 208V 3 Phase:

1.) This 1.25 Service Factor motor runs on 208V at 60 Hz and draws a full load current of 1.8 amperes. The required power supply shall be 3 asynchronous phases of 120 Volts each, plus neutral plus ground, each with 20 Amp capacity.

2.) This system shall be UL Listed in its entirety (motors, circuit protection, motor controls, user interface, enclosures, conductors and connectors all evaluated and approved for correct sizing and compatibility under maximum rated load on the motors) under UL Product Category FHJU, titled Electrical Drive and Controls for Folding and Telescopic Seating.

b.) Each pair of Powered Frames shall consist of output shaft gear reducer with [6 inch (152mm)] diameter x [4 inch (102mm)] wide wheels covered with non-marring [1/2 inch (13mm)] thick composite rubber, and operate the bleacher as follows:

1.) PF2 – Pulls at 46 feet / min [16.8 meters / min] with ½ Hp through 60:1 speed reduction to 4 drive wheels. Max pull approx 261 lbs [1161 N];

3. Annual Service Light

a.) The annual service light unit is a low voltage (24V) system that is integrated into the electrical control system on a powered bleacher.

1.) This system shall be UL Listed under UL Product Category FHJU, titled Electrical Drive and Controls for Folding and Telescopic Seating (UL File No. E467277).

b.) This unit serves two main functions:

1.) Keep a continuous timer running that will indicate to the end user that an annual inspection of the bleacher is required.

a.) The unit will retain the counting data for no less than 6 months without power.

b.) There will be a light illuminated at the front of the bleacher once the counter reaches one calendar year.

c.) The counter and light can be reset by authorized personnel once an inspection has been completed.

2.) Record the forward, reverse, and total operating time of bleacher.

a.) This data can be viewed at any time from inside of the unit.

c.) Manufacturer shall furnish parts and instructions for installing an annual service light unit on the primary seating bank.

C. Options

1. Limit Switches

a.) Limit switches will automatically stop integral power operation when seating has reached the fully extended or closed position. Manufacturer should furnish and install both open and closed limit switches for the integral power system. Power operation shall utilize a combination of contactors and limit switches to ensure the wiring is not energized except during operation.

2.9 FABRICATION

A. Fabricate understructure from structural-steel members in size, spacing, and form required to support design loads specified in referenced safety standard.

B. Weld understructure to comply with applicable AWS standards.

C. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.

D. Form exposed sheet metal with flat, flush surfaces, level and true in line, and without cracking and grain separation.

2.10 ACCESSORIES

A. Semi-Permanent Modular Video Platform: 4 feet (1219 mm) by 8 feet (2438 mm) with Rail sleeves, safety rails. Provide one for each bank.

B. Full Bleed Graphic Vinyl End Closure Curtain – Provide one at each end.

1. Provide closure curtains fabricated of vinyl-coated 14oz Polyester fabric on open ends of telescopic seating. Curtains to be permanently attached to wall or rear closure panel and secured to individual rows of seating. Curtain to open with seating unit into taut secure configuration and fold automatically as seating unit closes.

2. Curtain to have high resolution “full bleed” graphic logo or photograph located across entire visible surface area of the end curtain.

2.11 GRAPHICS

A. Xtreme Graphic Logo: The Xtreme Graphic Logo is comprised of decorative artwork and/or text that has been permanently bonded to the front vertical surface of the bleacher seat modules. The artwork is tiled, a process whereby a single large graphic is segmented and applied in separate parts to individual seat modules, which, when viewed together as a whole become a unified piece of artwork, similar to a mosaic. The graphics are printed as full color CMYK pigmented resin and adhesive layer onto a 100UM polyester clear glossy release film (transfer sheet). The application process uses a combination of heat and pressure to activate the adhesive and permanently bond the resin to the HDPE seat module. Once applied, the graphic cannot be removed from the seat module

without damaging or destroying the seat module surface. Customer must provide vector-based digital artwork, and approved layout indicating tiled application to individual seat modules to be provided with bid.

B. Courtside Graphic Logo: Decorative graphic logo that is applied to the applied to the integrally molded end cap recess area of the Courtside 10 XC seat module.

1. Logo is approximately [4.7 inches (119 mm)] x [3.5 inches (89 mm)] with full color.

2. Logo is trimmed to a precise custom cut shape with two mounting holes.

C. Media Graphic Rail Sleeve: Decorative graphic logo covering for media platform rail.

D. End Closure Curtain: Curtain to have high resolution “full bleed” graphic logo or photograph located across entire visible surface area of the end curtain.

3.0. - EXECUTION

3.1 EXAMINATION

A. Examine areas where telescoping stands are to be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Tolerances:

1. Flooring [and rear wall]: Level [and plumb] within [1/8 inch (3 mm)] in [8 feet (2438mm)].

2. Maximum bleacher force on the floor of a [27 foot (8230 mm)] section: Static point load of less than 300 psi (2068 kN/m2).

B. Install telescoping stands to comply with referenced safety standard and manufacturer's written instructions.

3.3 ADJUSTING AND CLEANING

A. On completion of installation, lubricate, test, and adjust each telescoping stand unit so that it operates according to manufacturer's written operating instructions.

B. Clean installed telescoping stands on exposed surfaces. Touch up shop-applied finishes or replace components as required to restore damaged or soiled areas.

3.4 MAINTENANCE SERVICE

A. Service Capability: Show proof of full-time service capability by factory certified technicians directly employed by the installer.

1. A four to eight-hour maximum on-site repair response is required during normal working hours, 8 a.m. to 5 p.m. weekdays (excluding holidays).

2. All Full Time Service Personnel shall be Factory Authorized and Trained.

3. Provide proof of Service Capability and a list of service parts regularly maintained in inventory.

3.5 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain telescoping stands.

END OF SECTION 126613

MACHINE ROOM-LESS HYDRAULIC PASSENGER ELEVATORS - SECTION 14 240

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Machine room-less hydraulic passenger elevators as shown and specified. Elevator work includes:
   1. Standard pre-engineered hydraulic passenger elevators.
   2. Elevator car enclosures, hoistway entrances and signal equipment.
   3. Operation and control systems.
   4. Jack(s).
   5. Accessibility provisions for physically disabled persons.
   6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
   7. Materials and accessories as required to complete the elevator installation.

B. Related Sections:
   1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
   2. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
   3. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
   4. Division 5 Metals:
      a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
      b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
   5. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
   6. Division 16 Sections:
      a. Providing electrical service to elevators, including fused disconnect switches where permitted. (note: fused disconnect switch to be provided as part of elevator manufacture product, see section 2.11 Miscellaneous elevator components for further details.)
      b. Emergency power supply, transfer switch and auxiliary contacts.
      c. Heat and smoke sensing devices.
      d. Convenience outlets and illumination in control room (if applicable), hoistway and pit.
   7. Division 22 Plumbing
      a. Sump pit and oil interceptor.
   8. Division 23 Heating, Ventilation and Air Conditioning
      a. Heating and ventilating hoistways and/or control room.

C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Part 3 for hydraulic elevators. State or local requirements must be used if more stringent. The cost of this work is not included in the TK Elevator’s proposal, since it is a part of the building construction.
   1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.

2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
4. Elevator hoistways shall have barricades, as required.
5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
9. All wire and conduit should run remote from the hoistways.
10. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.
11. Install and furnish finished flooring in elevator cab.
12. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
13. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
14. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
15. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
16. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
17. General Contractor shall fill and grout around entrances, as required.
18. All walls and sill supports must be plumb where openings occur.
19. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
20. Provide telephone line, light fixture (200 lx / 19 fc), and convenience outlet in the hoistway at the landing where the elevator controller is located. Typically this will be at the landing above the 1st floor. Final location must be coordinated with elevator contractor.
21. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway.
22. For signal systems and power operated door: provide ground and branch wiring circuits.
23. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.
24. Controller landing wall thickness must be a minimum of 8 1/2 inches thick. This is due to the controller being mounted on the second floor landing in the door frame on the return side of the door. For center opening doors, the controller is located on the right hand

frame (from inside the elevator cab looking out). These requirements must be coordinated between the general contractor and the elevator contractor.

25. Cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc..

1.02 SUBMITTALS

A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.

B. Shop drawings:
   1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
   2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
   3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
   4. Indicate electrical power requirements and branch circuit protection device recommendations.

C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

E. Metal Finishes: Upon request, standard metal samples provided.

F. Operation and maintenance data. Include the following:
   1. Owner's manuals and wiring diagrams.
   2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
   1. The manufacturer of machines, controllers, signal fixtures, door operators cabs, entrances, and all other major parts of elevator operating equipment.
      a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
   2. The manufacturer shall have a documented, on-going quality assurance program.
   3. ISO-9001:2000 Manufacturer Certified
   4. ISO-14001:2004 Environmental Management System Certified
   5. LEED Gold certified elevator manufacturing facility.

B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:

1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
2. Building Code: National.
3. NFPA 70 National Electrical Code.
4. NFPA 80 Fire Doors and Windows.
5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG)
6. Section 407 in ICC A117.1, when required by local authorities
7. CAN/CSA C22.1 Canadian Electrical Code
8. CAN/CSA B44 Safety Code for Elevators and Escalators.
9. California Department of Public Health Standard Method V1.1–2010, CA Section 01350

D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

E. Inspection and testing:

1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
2. Arrange for inspections and make required tests.
3. Deliver to the Owner upon completion and acceptance of elevator work.

F. Sustainable Product Qualifications:
1. Environmental Product Declaration:
   a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate se.
   b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed life-cycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.
2. Material Transparency:
   a. GOOD: Provide Health Product Declaration at any level
   b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool.
   c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.
3. LEED v4 – Provide documentation for all Building Product Disclosure AND Optimization credits in LEED v4 for product specified.
4. Living Building Challenge Projects: Provide Declare label for products specified.

1.04 DELIVERY, STORAGE AND HANDLING

A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS

A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.06 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.07 MAINTENANCE

A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.
    1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
    2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
    3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Design based around TK Elevator’s endura Machine Room-Less hydraulic elevator.

2.02 MATERIALS, GENERAL

A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.

B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.

C. Steel:
    1. Shapes and bars: Carbon.
    2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
    3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture’s standard selections.

D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture’s standard selections.

E. Flooring by others.

2.03 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.

B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.

D. Guides: Slide guides shall be mounted on top and bottom of the car.

E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.

F. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless. Two jacks piped together, mounted one on each side of the car with a polished steel hydraulic plunger housed in a sealed steel casing having sufficient clearance space to allow for alignment during installation. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section..

G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper viscosity grade inherently biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details)

I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform “flooded pit operation”, which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.

J. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also a means for manual operation at the valve in the pit is required.

2.04 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
   1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather
   2. An oil hydraulic pump.
   3. An electric motor.
   4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.

B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating – motors shall be capable of 80 starts per hour with a 30% motor run time during each start.

D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
   1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
   2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
   3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
   4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
   5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
   6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
   7. A secondary hydraulic power source (powered by 110VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e. pump motor, starter, etc.)
   8. Oil Type: Provide a zinc free, inherently biodegradable lubricant formulated with premium base stocks to provide outstanding protection for demanding hydraulic systems, especially those operating in environmentally sensitive areas.

2.05 HOISTWAY ENTRANCES

A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
   1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
   2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish with no. 4 brushed finish entrance frame.
   3. Typical door & frame finish: Stainless steel panels, no. 4 brushed finish with no. 4 brushed finish entrance frame.

B. Integrated Control System: the elevator controller to be mounted to hoistway entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.

C. At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details

D. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
   1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
   2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
   3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

F. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 PASSENGER ELEVATOR CAR ENCLOSURE

A. Car Enclosure:
   1. Walls: Cab type TKS, reinforced cold-rolled steel. Walls shall be finished with factory applied powder coat.
   2. Reveals and frieze: Not Applicable
   3. Canopy: Cold-rolled steel with hinged exit.
   4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.
   5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel
   6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
      a. Door Finish: ASTM A1008 steel panels, factory applied powder coat enamel finish.

b. Cab Sills: Extruded aluminum, mill finish.

7. Handrail: Provide 2” flat metal bar on rear wall only on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, no. 4 brushed finish.
8. Ventilation: Manufacturer’s standard exhaust fan, mounted on the car top.
9. Protection pads and buttons: Not required

B. Car Top Inspection: Provide a car top inspection station with an “Auto-Inspection” switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.

7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED’s shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.

B. Emergency Communications System: Integral phone system provided.

C. Auxiliary Operating Panel:

D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

E. Special Equipment:
Limited Access Operation: N/A

F. Digital Services: Cloud-based IoT monitoring system comes standard with these options:

Remote Monitoring with Application Programming Interface (API) Integration

ADA Phone - Code Compliant Cellular Connectivity

2.09 CONTROL SYSTEMS

A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

B. Service Panel – to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
    1. Access to main control board and CPU
    2. Main controller diagnostics
    3. Main controller fuses
    4. Universal Interface Tool (UIT)
    5. Remote valve adjustment
    6. Electronic motor starter adjustment and diagnostics
    7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit
    8. Operation of auxiliary pump/motor (secondary hydraulic power source)
    9. Operation of electrical assisted manual lowering
    10. Provide male plug to supply 110VAC into the controller
    11. Run/Stop button

C. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

D. Emergency Power Operation: (Battery Lowering 10-DOC) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shutdown. When normal power becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.

E. Special Operation: Hall Card Reader Provisions

F. Digital Services:

    Cloud-based IoT Monitoring System (standard): Contractor shall provide a cloud-based IoT (internet of things) monitoring system capable of tracking door movements and timing, trips, power cycles, car calls, out-of-service events and modes. This observation will continue 24/7 and it shall be capable of providing service technicians a minimum of three recommended solutions for defined failure events and automatically dispatch service technicians in the event of failure(s) while sending notifications to end users of changes in their equipment's state via both email and mobile device. Access to IoT and related equipment data and status will be made available in both a web portal and mobile application secured by password and username with at least two-factor authentication. Finally, this system must be self-contained and not require internet provision by others.

    Along with the monitoring system, options are available.

    Remote Monitoring with Application Programming Interface (API) Integration: Contractor shall provide a portal and mobile device application (app) that communicates relevant service and operational information such as elevator operational status, open service call tickets, call ticket history and performance and service history. This system shall provide a REST application programming interface (API) capable of transmitting relevant information from the cloud-based IoT

monitoring system. This data includes equipment operational status, door movements, service and maintenance history, traffic statistics and failure alerts.

ADA Phone – Code Compliant Cellular Connectivity: Contractor shall provide a phone service through a self-contained cellular based VoIP system. This system shall meet code, include a backup battery capable of powering the emergency communication equipment for 4+ hours in the event of a power outage. The solution shall have remote monitoring capability to ensure continuous connectivity with a means of remote troubleshooting. Remote monitoring capability shall include, at a minimum, the ability to monitor connectivity and power supply. Remote monitoring shall be capable of providing local alerts to response personnel when on-site intervention is required.

2.10 HALL STATIONS

A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
    1. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
        a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

C. Hall Position Indicator: Not Applicable

D. Hall lanterns: Not Applicable

E. Special Equipment:
Limited access operation: Hall Card Reader Provisions at both landings.

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.

C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code

PART 3 EXECUTION

3.01 EXAMINATION

A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

A. Install elevator systems components and coordinate installation of hoistway wall construction.
   1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
   2. Comply with the National Electrical Code for electrical work required during installation.

B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.

C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.

D. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.

E. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.

F. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.

G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

H. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.

I. Lubricate operating parts of system, where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.

B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.

B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
    1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

A. Elevator Qty. 1
    1. Elevator Model: endura MRL Twinpost above-ground 1-stage

2. Elevator Type: Hydraulic Machine Room-Less, Passenger
3. Rated Capacity: 2100 lbs.
4. Rated Speed: 75 ft./min.
5. Operation System: TAC32H
6. Travel: 12'-8"
7. Landings: 2 total
8. Openings:
   a. Front: 2
   b. Rear: 0
9. Clear Car Inside: 5'-8" wide x 4'-3" deep
10. Inside clear height: 7'-4" standard
11. Door clear height: 7'-0" standard
12. Hoistway Entrance Size: 3'-0" wide x 7'-0" high
13. Door Type: One-speed | RH Side opening
14. Power Characteristics: 460 volts, 3 Phase, 60 Hz.
15. Seismic Requirements: Zone
16. Hoistway Dimensions: 7'-4" wide x 5'-9" deep
17. Pit Depth: 4'-0"
18. Button & Fixture Style: Traditional Signal Fixtures
19. Special Operations:
    Limited Access at Hall Stations with card readers by others
    Digital Services:
    Remote Monitoring with Application Programming Interface (API) Integration
    ADA Phone - Code Compliant Cellular Connectivity

3.09 SPECIAL CONDITIONS (Note: Add Special Conditions as Needed)

END OF SECTION

COMMON WORK RESULTS FOR HVAC - SECTION 15010

PART 1 GENERAL

1.01 SCOPE

A. HVAC means Heating, Ventilation and Air Conditioning.

B. Provisions of this Section apply to all HVAC and Building Management and Control System (BMCS) work.

C. Include the provisions of General, Supplementary and Special Conditions and provisions of the Specifications shall apply to and form a part of this Section.

D. Provide all labor, materials, equipment, and services necessary for the completion of all HVAC work shown or specified, except work specifically specified to be done or furnished under other sections of the Specifications. Include performing all operations in connection with the complete HVAC installation in strict accordance with the specification and applicable drawings subject to the terms and conditions of the Contract.

E. Give required notices, file drawings, obtain and pay for permits, deposits and fees necessary for the installation of the HVAC work. Obtain and pay for inspections required by laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspections, and file such certificates with Owner.

F. "Provide" means to furnish and install, complete and ready for operation.

G. All equipment shall be U.L. or E.T.L. listed as an assembly.

1.02 DRAWINGS

A. HVAC Drawings are diagrammatic and subject to requirements of Architectural Drawings. HVAC Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work. Coordinate with Architectural, Structural, Electrical, Plumbing and other Building Drawings.

B. Follow the Drawings closely, check dimensions with Architectural Drawings and field conditions. DO NOT scale HVAC Drawings for location of system components.

C. Do not scale Drawings to locate ceiling diffusers. Coordinate with lighting, ceiling grids and/or reflected ceiling plans.

D. Drawings and Specifications are complimentary. Work shown on the drawings or specified in the specifications is binding as if shown or specified on both. Any discrepancies between the drawings and specifications shall be brought to the attention of the Consultant for clarification during the bidding process. Discrepancies shall be addressed via a written Request for Information and answers from the Consultant will be issued by Addendum prior to bidding.

1.03 APPLICABLE CODES AND STANDARDS

A. Comply with the current editions of the following Codes and Standards:
   1. ANSI/ASHRAE 15 - Code for Building Services Piping.
   2. ANSI B9.1 - Safety Code for Mechanical Refrigeration.
   3. ASME Boiler and Pressure Vessel Code.
   4. NFPA 54 - National Fuel Gas Code.
   5. NFPA 30 - Storage of Flammable Liquids.
   6. NFPA 31 - Oil Burning Equipment.
   7. NFPA 99 - Health Care Facilities.
   8. NFPA 70 - National Electrical Code.
   9. NFPA 90A - Air Conditioning and Ventilating Systems.
   10. NFPA 91 - Blower and Exhaust Systems.
   11. NFPA 96 - Commercial Cooking Equipment, Vapor Removal.
   12. NFPA 101 - Life Safety Code.
   13. Current Edition of SMACNA – HVAC Duct Construction Standards.
   14. Other Standard as referenced in other Sections of Division 23.
   15. Local Building Code (International Building Code if no local Building Code in effect).

16. Local Plumbing Code (International Plumbing Code if no local Plumbing Code in effect).
17. Local Gas Code (International Gas Code if no local Gas Code in effect).
18. Local Mechanical Code (International Mechanical Code if no local Code in effect).

1.04 QUALIFICATIONS OF SUBCONTRACTOR

A. The HVAC Contractor shall meet the following qualifications:
   1. The HVAC Contractor shall have been in business as a HVAC Contractor for at least three (3) years prior to Bid Date. The HVAC Contractor shall have held a license from the State Licensing Board for General Contractors for at least three (3) years prior to Bid Date.
   2. The HVAC Contractor shall have a satisfactory experience record with HVAC installations of character and scope comparable with this project and have completed five projects of the same cost (or more) as the cost of this project, and for at least three (3) years prior to the Bid Date shall have had an established service department capable of providing service inspection or full maintenance contracts.
   3. Contractor must have bonding capacity for project of this size and must bond the project, if required by the General Conditions of the contract.

1.05 CONFLICTS AND INTERFERENCES

A. If systems interfere or conflict, the Architect shall decide which equipment to relocate regardless of which was first installed.

B. Make no changes without the Architect’s written permission. In case of doubt, obtain Architect’s decision before proceeding with work. Failure to follow this instruction shall make the Contractor liable for damage to other work and responsible for removing and repairing defective or mislocated work in proper manner.

1.06 WORKMANSHIP

A. Do all work in a neat and first-class manner. Remove and replace work not done in such manner as directed by the Architect.

1.07 COOPERATION

A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

B. Coordinate construction of all Mechanical work with Architectural, Structural, Civil, Electrical Work, etc. as shown on other contract documents.

1.08 VISITING SITE

A. Visit site and become familiar with location and various conditions affecting work. No additional allowance will be granted because of lack of knowledge of such conditions.

B. Any discrepancies or interferences shall be reported immediately to the Architect.

1.09 SCHEDULED WORK HOURS AND FACILITY OCCUPANCY

A. Schedule all connections to existing systems and shutdowns with the Owner.

PART 2 PRODUCTS

2.01 MATERIALS, SUBSTITUTIONS AND SUBMITTALS

A. Unless otherwise noted, provide new, standard, first-grade materials throughout. Equipment and materials furnished shall be fabricated by manufacturer regularly engaged in their production and shall be the standard and current model for which replacement parts are available. HVAC equipment shall be substantially the same equipment of a given manufacturer which has been in successful commercial use and operation for at least three (3) years.

B. Where materials or products are specified by manufacturer's name, brand, trade name, or catalog reference, such named materials or products shall be the basis of the Bid, and shall be furnished under the Contract unless requests for substitutions are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.

C. Substitutions will be considered only if written request for approval has been received by the Architect ten (10) days prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which substitution is proposed, specification section/paragraph number and a complete description of the proposed substitute including drawings, cuts, performance and test data, samples and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute may require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution is final.

D. If the Architect approves any proposed substitution prior to receipt of Proposals, approval will be set forth in an Addendum. Do not rely upon approvals made in any other manner. Prior approval to be secured for "equal" or "approved equal" manufacturer.

E. No substitutions will be considered after the Contract has been executed, except as described in the General Conditions.

F. Provide submittal in PDF format for each specification section. Refer to each specification section for submittal requirements. Before ordering materials and equipment, submit to Architect and obtain his approval of a detailed list showing each item which is to be furnished by make, trade name, catalog number, or the like; together with manufacturer's specifications, certified prints, and other data sufficient for making comparisons with items specified. When approved, such schedule shall be of equal force with these specifications in that no variation there from shall be allowed except with Architect's written approval. Number of Shop Drawings and procedure shall be as directed by the Architect.

G. Architect and / or Engineer's approval of submittal data does not relieve the contractor of his responsibility to comply with the contract documents.

H. It is the responsibility of the Mechanical contractor to coordinate all Electrical requirements of the submitted equipment with the Electrical Contractor. Any increase in cost due to a variance between the contract documents and the submitted equipment shall be the responsibility of the Mechanical Contractor.

I. All pressure vessels shall be constructed and tested in accordance with applicable ASME Codes and shall bear ASME stamps. Certificates of inspection and approval shall be submitted to Architect.

J. Similar items of equipment shall be the product of the same Manufacturer.

K. See section, "ALTERNATES" in other section of the Specifications and Bid accordingly.

2.02 SHOP DRAWINGS

A. Before starting work, submit and obtain approval of detailed drawings of the following, fully dimensioned (including elevations of ductwork and piping) and drawn not less than 1/4"= 1'-0" scale. Submit one (1) set of shop drawings in PDF format.

1. For ductwork shop drawings, do not scale diffuser locations, coordinate with ceiling grids and lighting layout.

2.03 RECORD DRAWINGS

A. When work starts, obtain white prints of the HVAC Drawings. All corrections, variations, and deviations, including those required by change orders, if any, must be recorded in colored ink or colored pencil at the end of each working day on these drawings. The marked prints shall be available at all times for the Architect's inspection.

B. Prior to examining the request for final payment or making any response thereto, the Architect shall receive from the Contractor one (1) complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this Contract.

C. The Architect will forward the marked white prints to the Consulting Engineers for review. They will then be returned by the Architect to the Contractor for use in preparing record drawings.

D. When work is completed Contractor shall purchase from the Architect (At Architects' printing cost) one (1) set of prints of HVAC Drawings for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to record drawings, removing all superseded data in order to show the actual completed conditions.

1. Accurately shown location, size and elevation of new exterior piping work and its relationship to any existing piping and utilities, obstructions, etc., contiguous to the area of work.
2. Block out areas modified by change-order and identify them by change-order number.

E. Ductwork and Control Drawings may be a set of printed shop drawings or in PDF format, up-dated to show actual conditions at completion of work.

F. HVAC piping drawings may be prepared as noted in paragraph "D" above, or HVAC piping may be added to the ductwork shop drawings as noted in paragraph "E" above.

2.04 ACCESS DOORS:

A. Doors in non-fire rated walls and ceilings: 17-gauge steel with hinges and screwdriver latches, Bilco, Milcor, Miami-Carey, or equal. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Provide door styles compatible with adjoining surfaces as selected by Architect. Size doors to permit removal of equipment and/or maintenance, minimum size 18" X 18".

B. Mark lay-in ceilings with stick-on label (white label with black text) at maintenance access points. Label shall be placed on ceiling grid.

2.05 ELECTRICAL EQUIPMENT

A. Verify current characteristics before ordering equipment.

B. Should the Contractor with the Architect's/Engineer's approval make changes in electrical equipment from those shown on the Electrical Drawings, he shall be responsible for the coordination and cost of required changes.

C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

D. Verify electrical characteristics of all equipment and voltages available with Electrical Section prior to ordering any electrical equipment.

PART 3 EXECUTION

3.01 SITE VISITS

A. Mechanical contractor shall have a representative available for all on-site meetings requested by the Engineer and for all regularly scheduled in-wall, above ceiling, and final site observations.

3.02 PROTECTION OF ROTATING PARTS

A. Equip exposed belt drives with belt guards with holes for measuring speeds of driven shafts.

B. Provide exposed couplings with coupling guards.

C. Equip propeller fans with guards.

D. Equip inlets and outlets of open centrifugal fans with 1 1/2" #10 Diamond mesh galvanized steel screens.

E. All motors or other equipment exposed to weather shall be provided with weatherproof covers.

3.03 PROTECTION OF EQUIPMENT

A. During construction, protect mechanical equipment from damage or deterioration.

B. When installation is complete, clean equipment and make ready for painting.

C. During construction all ductwork, piping, and equipment shall be stored in a clean/dry location. Any ductwork or piping stored outside that is not protected shall be removed from the job site.

D. Installed ductwork and piping shall have open ends covered at the end of each work day to prevent dust, dirt, and water from entering the ductwork and piping.

E. Seal all joints and seams of ductwork as it is installed.

3.04 INSTALLATION OF EQUIPMENT

A. Install equipment to provide normal service access to all components.

B. Provide sufficient space for removing components, install equipment to provide such clearance.

C. Install equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with contract documents, obtain Architect's decision before proceeding.

D. All equipment shall be firmly fastened in place:
   1. Roof curbs shall be secured to deck and structure and curb mounted items shall be secured to curbs.
   2. Pad mounted equipment shall be secured to pads using poured in place anchor bolts or cinch anchors.
   3. Vibration isolators shall be secured to floors, pads or structure and equipment shall be bolted to the isolators.

3.05 EQUIPMENT SUPPORTS

A. Provide supports for ductwork, piping and equipment. Hot dip galvanize after fabrication all grillage, supports, etc., located outdoors.

B. Set all floor-mounted equipment, other than condensate pumps, on concrete pads or rails (as indicated of height shown, but not less than 4" high). Coordinate pad height with condensate drain trap requirements. Chamfer rails and pads 1". Where shown, provide reinforced floating pads mounted on vibration isolators. Form, reinforce and pour any pads and rails required but not shown on Structural and Architectural Drawings.

3.06 CUTTING AND PATCHING

A. Set sleeves and inserts and lay-out and form openings in walls, beams, girders and structural floors in this Section.

B. Cut, patch and repair as required to accomplish HVAC Work and finish to match adjacent work. Architect's approval required before cutting any part where strength or appearance of finished work is involved.

3.07 INCIDENTAL WORK

A. Do all control wiring required for Mechanical work.

B. Final water connections to services are included in this Section.

C. Permanent drain connections for AC units, etc., and auto air vents to nearest floor drain are included in this Section.

D. (Healthcare Only) Outside air intakes shall be a minimum of 6'-0" above grade or 3'-0" above the roof.

E. Door louvers are not included in this Section.

F. Items obviously omitted from drawings and/or specifications shall be called to attention of the Architect / Engineer prior to submitting Bid, after award of Contract any changes or rearrangements necessary to complete Contract shall be at no additional cost to Owner.

3.08 DEMOLITION

A. Certain existing HVAC equipment to be removed and/or relocated as shown or noted. Equipment removed will remain the property of the Owner unless designated otherwise. Remove from the premises all items not retained by the Owner.

3.09 CONNECTIONS TO EXISTING SYSTEMS

A. Make connections to existing systems only at time authorized, in writing, by Owner.

B. Do not take heating or cooling system out of service during occupied working, office or school hours.

C. Drain existing systems and flush, fill, vent, test, balance and put existing systems into operation after connections have been made.

D. Repair existing insulation at points of connection to existing work. Insulation style and thickness at connections to existing ductwork shall match existing.

E. Mechanical contractor is required to replenish any chemicals after flushing and filling of closed or open loop piping systems.

3.10 PAINTING

A. Refinish equipment damaged during construction to new condition. Painting shall be provided by General Contractor.

B. Paint un-insulated duct surfaces visible through grilles and registers flat black.

C. Other painting is specified in "PAINTING SECTION, Finishes Division".

3.11 ACCESS DOORS

A. Provide access doors for valves, fire dampers, dampers, controls, air vents, and other items located above non-lift-out ceilings or behind partitions or walls.

3.12 USE OF HVAC SYSTEM DURING CONSTRUCTION

A. Ducted HVAC systems may be used during construction as long as the following conditions are met:

1. The construction site shall be kept clean and swept, wet mopped, or vacuumed on a regular basis to reduce the amount of airborne dust.
2. All AC units shall have filters installed in the AC units that are equal to the filters that are scheduled for each piece of equipment. The Mechanical contractor shall be responsible for changing the filters in all AC units during construction at a minimum of every 30 days starting from the day the AC units are started. At the completion of the project, the Mechanical contractor shall replace all filters.
3. All return air and outside air openings shall be protected with temporary filter media. The temporary filter media shall be changed by the Mechanical contractor. Temporary filter media is required to protect the installed ductwork. During or after construction, if any ductwork is observed without temporary filter media, the Mechanical contractor shall be solely responsible for cleaning the entire ductwork system and AC unit. Temporary filter media shall be changed bi-weekly at a minimum.
4. All AC units shall have all correct motor overload elements installed and all safeties shall be wired and operational prior to temporary use of the AC unit.
5. Temporary controls and temporary control sequences may be utilized by the contractor until the permanent controls and control sequences are installed. Temporary control methods shall be the sole responsibility of the contractor.
6. All AC units required to have factory start-up shall have factory start-up completed prior to use.
7. The building envelope for the area served by the AC units shall be substantially complete prior to using the AC units during construction. Temporary walls and doors shall be constructed by the General Contractor as needed.
8. Water treatment chemicals shall be provided by the Mechanical Contractor for all open and closed piping systems during construction. The Mechanical Contractor is responsible for maintaining proper chemical treatment during construction.
9. Correct levels of antifreeze shall be installed in all systems for which antifreeze is shown, scheduled or specified. The Mechanical Contractor is responsible for maintaining proper antifreeze levels during construction.

B. Ductless split systems shall NOT be used during construction. Protect all indoor sections of ductless split systems during construction to prevent dust, dirt, or water from entering the unit.

C. The Mechanical Contractor shall turn the system over to the Owner in condition which is equal to what would have occurred if they system had not been used during construction.

D. The Mechanical Contractor shall be responsible for any costs associated with cleaning the equipment or ductwork to return it to a like new condition prior to turning the system over to the Owner.

3.13 TEMPORARY HVAC

A. If the HVAC system can not be used during construction for whatever reason, the Mechanical Contractor shall be responsible for providing temporary heating / cooling. Temporary HVAC system shall be sized based on whatever conditions the General Contractor needs in order to execute his work, or shall be sized comparable to the capacities shown on the construction documents.

B. The mechanical contractor shall be responsible for coordinating all temporary power requirements and shall coordinate all temporary HVAC equipment locations and ductwork routing thru the building.

3.14 WARRANTY AND INSTRUCTIONS

A. See General Conditions - One-Year Warranty.

B. Contractor shall and hereby does warrant all materials, workmanship and equipment furnished and installed by him to be free from defects for a period of one (1) year after date of substantial completion of the Contract. Should any defects in materials, workmanship, or equipment be made known to Contractor within the one (1) year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.

C. All centrifugal, reciprocating, screw or scroll type refrigeration compressors shall bear five (5) year non-pro-rated parts warranty.

D. All gas fired air furnaces shall bear ten (10) year prorated heat exchanger warranties.

E. After completion of the work, Contractor shall operate the equipment which he installs for a period of ten (10) working days, as a test of satisfactory operating conditions. During this time, Contractor shall instruct the Owner's operating personnel in the correct operation of the equipment. Furnish necessary oral and written operating instructions to the Owner's representative.

F. Provide five (5) sets of manufacturer's operating and maintenance manuals and parts lists including nearest manufacturer's sales and service representative by name, address and phone for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency. Include all warranty dates on equipment and guarantees. Include names, address and phone of any subcontractor and work performed. Provide O&M manuals.

G. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.

H. Supply initial charges of refrigerant, refrigeration lubricating oil; and anti-freeze necessary for the correct operation of the equipment. Maintain these charges during the guarantee period, with no additional cost to the Owner, unless loss of charge is the fault of the Owner.

I. Make available to the Owner, without additional cost, service and adjustment of the equipment for the guarantee period.
   1. Service shall include:
      a. On call nuisance issues.
      b. Replenishing refrigerant and antifreeze if loss occurs due to system failure.
   2. Service shall not include:
      a. Routine maintenance of the equipment unless specified in specific equipment specification section(s).

3.15 TRAINING OF OWNER PERSONNEL

A. The General Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

B. Training shall be conducted twice during the 1-year warranty period. Training shall be scheduled during a warmer time of the year to demonstrate proper cooling operation of the HVAC system. Training shall also be scheduled during a cooler time of the year to demonstrate proper heating operation of the HVAC system.

C. The Engineer shall be responsible for approving the content and adequacy of the training of Owner personnel.
   1. Each Sub and vendor responsible for training shall submit a written training plan to the Mechanical Engineer for review and approval prior to training. The plan will cover the following elements:
      a. Equipment (include in training).
      b. Intended audience.
      c. Location of training.
      d. Objectives.
      e. Subjects covered (description, duration of discussion, special methods, etc.).

f. Duration of training on each subject.
g. Instructor for each subject.
h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.).
i. Instructor and qualifications.

2. For the primary HVAC equipment, the Controls Contractor shall discuss the control of the equipment during the mechanical training conducted by the manufacturer's representative.
3. The General Contractor shall develop an overall training plan and shall coordinate and schedule with the Subcontractors. The Engineer will recommend approval of the training to the Owner upon satisfactory completion using a standard approval form. The Owner and the Contractors shall sign the approval form.
4. Video recording of the training sessions shall be provided by the General Contractor and shall be given to the Owner.

D. Mechanical Contractor. The Mechanical Contractor shall have the following training responsibilities:
1. Provide the Mechanical Engineer and Owner with a training plan during the submittal process.
2. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of HVAC equipment including, but not limited to, pumps, boilers, furnaces, chillers, heat rejection equipment, air conditioning units, air handling units, fans, terminal units, controls and water treatment systems, etc.
3. Training shall normally start with classroom sessions followed by hands-on-training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
6. The Controls Contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
7. The training sessions shall follow the outline in the Table of Contents of the operations and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
8. Training shall include:
a. Use of the installation, operation and maintenance instruction material included in the O&M manuals.
b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
c. Discussion of relevant health and safety issues and concerns.
d. Discussion of warranties and guarantees.
e. Common troubleshooting problems and solutions.
f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
g. Discussion of any peculiarities of equipment installation or operation.
9. Hands-on training shall include start-up, operation in all modes possible, including manual, start-up, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.

10. The Mechanical Contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
11. Training shall occur after functional testing is complete, unless approved otherwise by the Owner.
12. Minimum Duration of Training. The Mechanical Contractor shall provide training on each piece of equipment according to the following schedule:

Hours	System
8	Packaged Rooftop Units & OSA Units
4	Split System AC or Heat Pumps
2	Fans
8	HVAC Controls

3.16 PROJECT CLOSE-OUT DOCUMENTS

A. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following in PDF format:
   1. Record drawings - sheet metal work.
   2. Air balance report.
   3. Equipment Submittal Data.
   4. Equipment operating and maintenance manuals.
   5. Maintenance schedule.
   6. Equipment warranty dates and guarantees.
   7. List of Owner's Personnel who have received maintenance instructions.
   8. Start up reports as indicated in other sections of this spec, including:
      a. Dedicated Outside Air Units

END OF SECTION

TESTING, ADJUSTING, AND BALANCING FOR HVAC - SECTION 15020

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Balancing Air Systems:
   1. Constant-volume air systems.

B. Testing, adjusting, and balancing existing systems and equipment.

C. Measurement of final operating condition of HVAC systems.

1.02 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.03 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, current edition.

B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods, current edition.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems, current edition.

D. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems, current edition.

E. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing, current edition.

1.04 SUBMITTALS

A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Provide reports in PDF format. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
   2. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   3. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   4. Units of Measure: Report data in I-P (inch-pound) units only.
   5. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name.
      e. Project location.
      f. Project Engineer.
      g. Project Contractor.
      h. Project altitude.
      i. Report date.

1.05 FIELD CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
   4. SMACNA (TAB).
   5. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

F. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.

3.02 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.
   1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. The Mechanical Contractor and Factory Representative of the Boilers, Chillers, AC units and major HVAC equipment has placed every item of such equipment into satisfactory operation with all automatic and safety devices operable.
   2. Systems are started and operating in a safe and normal condition.
   3. Temperature control systems are installed complete and operable.
   4. Proper thermal overload protection is in place for electrical equipment.
   5. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   6. Duct systems are clean of debris.
   7. Fans are rotating correctly.
   8. Fire and volume dampers are in place and open.
   9. Air coil fins are cleaned and combed.
   10. Access doors are closed and duct end caps are in place.
   11. Air outlets are installed and connected.
   12. Duct system leakage is minimized.
   13. Hydronic systems are flushed, filled, and vented.
   14. Pumps are rotating correctly.
   15. Proper strainer baskets are clean and in place.
   16. Service and balance valves are open.

Q. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

R. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Prepare a TAB plan that includes the following:

   1. Equipment and systems to be tested.
   2. Strategies and step-by-step procedures for balancing the systems.
   3. Instrumentation to be used.
   4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
   1. Airside:
      a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
      b. Duct systems are complete with terminals installed.
      c. Volume, smoke, and fire dampers are open and functional.
      d. Clean filters are installed.
      e. Fans are operating, free of vibration, and rotating in correct direction.
      f. Variable-frequency controllers' startup is complete and safeties are verified.
      g. Automatic temperature-control systems are operational.
      h. Ceilings are installed.
      i. Windows and doors are installed.
      j. Suitable access to balancing devices and equipment is provided.

C. Hold a pre-balancing meeting at least one week prior to starting TAB work.
   1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

D. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the Engineer to facilitate spot checks during testing.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
   1. Running log of events and issues.
   2. Discrepancies, deficient or uncompleted work by others.
   3. Contract interpretation requests.
   4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

G. The Mechanical Contractor shall submit equipment manufacturers' start up reports for all major HVAC equipment.

H. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

I. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 GENERAL PROCEDURE FOR BALANCING AIR SYSTEMS

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross-sectional area of duct.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Measure air quantities at air inlets and outlets.

E. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

F. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

G. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

H. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

I. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

J. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

K. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

L. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

M. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

N. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

O. On fan powered VAV boxes, adjust air flow switches for proper operation.

P. For variable-air-volume systems, develop a plan to simulate diversity.

Q. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

R. Verify that motor starters are equipped with properly sized thermal protection.

S. Check dampers for proper position to achieve desired airflow path.

T. Check for airflow blockages.

U. Check condensate drains for proper connections and functioning.

V. Check for proper sealing of air-handling-unit components.

3.07 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.

c. Measure static pressure across each component that makes up the air-handling system.
d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from **Architect** for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.08 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer’s name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.09 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record fan and motor operating data.

3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.

3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.
    i. Center-to-center dimensions of sheave and amount of adjustments in inches.
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h.
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air temperature differential in deg F.
e. Entering-air static pressure in inches wg.
f. Leaving-air static pressure in inches wg.
g. Air static-pressure differential in inches wg.
h. Low-fire fuel input in Btu/h.
i. High-fire fuel input in Btu/h.
j. Manifold pressure in psig.
k. High-temperature-limit setting in deg F.
l. Operating set point in Btu/h.
m. Motor voltage at each connection.

n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h.

G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm.
i. Face area in sq. ft.
j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Airflow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

END OF SECTION

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT - SECTION 15061

PART 1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify the Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

1.02 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
   1. Fiberglass Channel (Strut) Framing Systems: Include requirements for strength derating according to ambient temperature.

B. Installer's Qualifications: Include evidence of compliance with specified requirements.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.03 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 055000.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with MSS SP-58.
   2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be

supported with a minimum safety factor of 2. Include consideration for vibration, equipment operation, and shock loads where applicable.

5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123 or ASTM A153.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation
    b. Ferguson Enterprises Inc.
    c. Thomas & Betts Corporation.
    d. Unistrut.
    e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
3. Comply with MFMA-4.
4. Channel Material:
    a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
6. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    a. Equipment Supports: 1/2 inch diameter.
    b. Piping up to 1 inch nominal: 1/4 inch diameter.
    c. Piping larger than 1 inch nominal: 3/8 inch diameter.
    d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

D. Steel Cable:
1. Manufacturers:
    a. Ductmate Industries, Inc.
    b. Source Limitations: Furnish associated fittings, accessories, and hardware produced by a single manufacturer.

E. Thermal Insulated Pipe Supports:
1. General Construction and Requirements:
    a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
    b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
    c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
    d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by a 360 degree, PVC jacketing.
2. PVC Jacket:
    a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
    b. Minimum Service Temperature: Minus 40 degrees F.
    c. Maximum Service Temperature: 180 degrees F.

d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96.
e. Thickness: 60 mil.
f. Connections: Brush on welding adhesive.

3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.

F. Pipe Supports:
1. Liquid Temperatures Up To 122 degrees F:
a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
b. Support From Below: MSS SP-58 Types 35 through 38.
2. Operating Temperatures from 122 to 446 degrees F:
a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
c. Sliding Support: MSS SP-58 Types 35 through 38.

G. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
1. Manufacturers:
a. Anvil International
2. Material: Malleable iron, ASTM A47; or carbon steel, ASTM A36.
3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

H. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
1. Manufacturers:
a. Ferguson Enterprises Inc.
2. Material: ASTM A36 carbon steel or ASTM A181 forged steel.
3. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

I. Riser Clamps:
1. Manufacturers:
a. Ferguson Enterprises Inc.
2. Provide copper plated clamps for copper tubing support.
3. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.

J. Strut Clamps: Two-piece pipe clamp.

K. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.

L. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
1. Material: Malleable iron, ASTM A47; or carbon steel, ASTM A36.
2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

M. Intermediate Pipe Guides: Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.
1. Manufacturers:
a. Anvil International
2. Pipe Diameter 6 inches and Smaller: Provide minimum clearance of 0.16 inch.
3. Pipe Diameter 8 inches: Provide U-bolts with double nuts providing minimum clearance of 0.28 inch.
4. Pipe Diameter 8 inches: 0.625 inch U-bolt.
5. Pipe Diameter 10 inches: 0.75 inch U-bolt.
6. Pipe Diameter 12 to 16 inches: 0.875 inch U-bolt.
7. Pipe Diameter 18 to 30 inches: 1 inch U-bolt.

N. Pipe Alignment Guides: Galvanized steel.
1. Manufacturers:

a. Anvil International
2. Pipe Diameter 8 inches and Smaller: Spider or sleeve type.
3. Pipe Diameter 10 inches and Larger: Roller type.
4. Pipe Diameter 18 to 30 inches: 1 inch U-bolt.

O. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

P. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:
a. Anvil International; H-Block
b. Cooper B-Line
c. Ferguson Enterprises Inc
d. Unistrut
2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

Q. Pipe Shields for Insulated Piping:
1. General Construction and Requirements:
a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
b. Shields Material: UV-resistant polypropylene with glass fill.
c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
d. Minimum Service Temperature: Minus 40 degrees F.
e. Maximum Service Temperature: 178 degrees F.
f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

R. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
a. Comply with MFMA-4.
b. Channel Material: Use galvanized steel.
c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
10. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

D. Unless specifically indicated or approved by the Engineer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by the Engineer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

H. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
   5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

J. Secure fasteners according to manufacturer's recommended torque settings.

K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

PART 1 GENERAL

1.01 DEFINITIONS

A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g. ductwork, piping).

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Notify the Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

1.03 SUBMITTALS

A. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
   1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification method for spring element load capacities.
   2. Seismic Controls: Include seismic load capacities.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Product Data:
   1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
   2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.

1.04 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Perform design and installation in accordance with applicable codes.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
   3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
   4. Select vibration isolators for outdoor equipment to comply with wind design requirements.
   5. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inch operating clearance beneath base unless otherwise indicated.

D. Equipment Isolation: As indicated on drawings.

2.02 MANUFACTURERS

A. Kinetics Noise Control, Inc

B. Mason Industries

C. Vibration Eliminator Company, Inc

2.03 PERFORMANCE REQUIREMENTS

A. General:
   1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
   2. Steel springs to function without undue stress or overloading.
   3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
   4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
   5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.04 VIBRATION ISOLATORS

A. General Requirements:
   1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
   2. Spring Elements for Spring Isolators:
      a. Color code or otherwise identify springs to indicate load capacity.
      b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
      c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
      d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
      e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
      f. Selected to function without undue stress or overloading.
   3. Seismic Snubbing Elements for Seismic Isolators:
      a. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
      b. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

B. Vibration Isolators for Non-Seismic Applications:
   1. Resilient Material Isolator Pads:

a. Description: Single or multiple layer pads utilizing elastomeric (e.g. neoprene, rubber) or fiberglass isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.

2. Resilient Material Isolator Mounts, Non-Seismic:
a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) or fiberglass isolator material; fail-safe type.

3. Housed Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
b. Furnished with integral elastomeric snubbing elements, non-adjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
c. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
d. Furnished with integral leveling device for positioning and securing supported equipment.

C. Non-Seismic Type:
1. All Elastomeric-Fiber Glass Pads:
a. Configuration: Flat or molded.
b. Thickness: 0.25 inch minimum.
c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.

2. Ribbed Elastomeric Pads:
a. Configuration: Flat/Ribbed.
b. Thickness: 0.25 inch minimum.
c. Assembly: Single or double ribbed, galvanized sheet metal separation when 2 sheets bonded together, oil resistant compound with no color additives.

3. Elastomeric Mounts:
a. Material: Oil, ozone, and oxidant resistant compounds.
b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.

4. Steel Springs:
a. Assembly: Freestanding, laterally stable without housing, steel base plates, ribbed elastomeric pads.
b. Leveling Device: Leveling bolts, rigidly connected to equipment or frame.

5. Restrained Steel Springs:
a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.

6. Elastomeric Hangers:
a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.

7. Spring Hanger:
a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

8. Combination Elastomeric-Spring Hanger:
a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

9. Thrust Restraints:
    a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
    b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Field-Welding (where approved by the Engineer): Comply with Section 055000.

E. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

F. Vibration Isolation Systems:
    1. Vibration-Isolated Equipment Support Bases:
        a. Provide specified minimum clearance beneath base.
    2. Spring Isolators:
        a. Position equipment at operating height; provide temporary blocking as required.
        b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
        c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
    3. Isolator Hangers:
        a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
        b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
    4. Thrust Restraints:
        a. Adjust restraint movement under normal operating static pressure.
    5. Clean debris from beneath vibration-isolated equipment that could cause short circuiting of isolation.
    6. Use elastomeric grommets for attachments where required to prevent short circuiting of isolation.
    7. Adjust isolators to be free of isolation short circuits during normal operation.
    8. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

END OF SECTION

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT - SECTION 15076

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Pipe markers.

C. Ceiling labels.

D. Thermostat labels.

1.02 SUBMITTALS

A. Product Data: Provide manufacturers catalog literature for each product required.

B. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Automatic Controls: Tags.

C. Heat Transfer Equipment: Nameplates.

D. Instrumentation: Tags.

E. Small-sized Equipment: Tags.

F. Thermostats: Nameplates.

G. Fans: Nameplates.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC
   2. Brimar Industries, Inc.
   3. Kolbi Pipe Marker Co.
   4. Seton Identification Products, a Tricor Direct Company
   5. Substitutions: See Section 016000 - Product Requirements.

B. Letter Color: Black for normal power and Red for emergency power.

C. Letter Height: 1/4 inch.

D. Background Color: White.

E. Plastic: Conform to ASTM D709.

2.03 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation
   2. Brimar Industries, Inc.
   3. Kolbi Pipe Marker Co.
   4. MIFAB, Inc.
   5. Seton Identification Products, a Tricor Company

B. Color: Conform to ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping. Letter size shall be at least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

2.04 CEILING LABELS

A. Provide labels generated from a label maker and fully adhered to ceiling grid or access doors wherever equipment is required to be accessed.

B. Labels shall identify equipment based on construction documents nomenclature and shall coordinate with the building automation system nomenclature for equipment.

C. Color code as follows:
1. HVAC Equipment: Black text on a White label.

2.05 THERMOSTAT LABELS

A. Provide labels generated from a label maker and fully adhered to the face of the thermostat. Thermostat labels shall be white labels with black text and shall correspond to the equipment ID located on the construction documents and building automation system. Coordinate with owner for any special label requirements for the building.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. In existing building replace all existing nameplates which do not comply with above colors.

B. Install plastic pipe markers in accordance with manufacturer's instructions. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.
1. Label Spacing and Extent:
   a. On straight run of pipes; Above suspended ceilings space labels approximately 10 feet on center; elsewhere, 20 feet on center.
   b. Wherever a pipe enters or leaves a room or building.
   c. At change of direction.
   d. At main valves and control valves (not equipment valves).
   e. On risers, just above and below floors.

C. Pipe Label Color Schedule:
1. Coordinate label color scheme with building owner.
2. Condensate Drain Piping: White letters on a safety-green background
3. Refrigerant Piping: Black letters on a safety-orange background

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions. Tape labels shall fully encircle piping so piping label is fully adhered to itself.

E. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

C. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.05 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in “Hangers and Supports for HVAC Piping and Equipment” specification section.

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.06 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Building shall be at a state of construction to prevent rain water from coming in contact with insulation that is installed on ductwork or stored on site.

C. Maintain temperature during and after installation for minimum period of 24 hours.

1.08 DEFINITIONS

A. Exposed: Exposed to view when construction is complete. Items which are not "exposed" are "concealed".

B. Attic: Any space that is between an insulated ceiling and a non-insulated roof.

C. Exterior: Any space that is external to the conditioned building envelope.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 CLOSED-CELL FOAM PIPE COVERING

A. Manufacturer:
   1. Aeroflex USA, Inc.
   2. Armacell LLC; AP Armaflex
   3. K-Flex USA LLC; K-Flex Titan

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 1; use molded tubular material wherever possible.
   1. 'K' Value:
      a. 0.245 Btu*in/(hr*ft^2*°F) at 75°F, 3/8” through 1” thickness.
      b. 0.28 Btu*in/(hr*ft^2*°F) at 75°F, 1-1/2” through 2” thickness.
   2. Minimum Service Temperature: Minus 297°F.
   3. Maximum Service Temperature: 220°F.
   4. Water Absorption: 0.2% by volume.
   5. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

D. Pipe covering may be seamless insulation slipped over piping before fabrication or may be slit longitudinally and installed over fabricated piping.

E. Make fitting covers from segments of pipe covering.

F. Cement all joints and seams in accordance with manufacturer’s recommendations.

2.03 JACKETS

A. PVC Plastic.
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96.
      d. Thickness: 10 mil.
      e. Connections: Pressure sensitive color matching vinyl tape.
   2. Covering Adhesive Mastic: Compatible with insulation.

B. ABS Plastic:
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: Minus 40 degrees F.
      b. Maximum Service Temperature: 180 degrees F.
      c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E96.
      d. Thickness: 30 mil.
      e. Connections: Brush on welding adhesive.

C. Aluminum Jacket: ASTM B209 formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Stucco embossed.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested and are free of defects before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.03 INSTALLATION

A. Repair existing insulation at points of connection to existing work.

B. Install in accordance with manufacturer's instructions.

C. Install in accordance with NAIMA National Insulation Standards.

D. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

E. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

F. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

G. Install insulation with longitudinal seams at top and bottom of horizontal runs.

H. Install multiple layers of insulation with longitudinal and end seams staggered.

I. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

J. Keep insulation materials dry during application and finishing.

K. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

L. Install insulation with least number of joints practical.

M. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

Q. Exposed Piping: Locate insulation and cover seams in least visible locations.

R. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

S. For hot piping conveying fluids 140°F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

T. For hot piping conveying fluids over 140°F, insulate flanges and unions at equipment.

U. Inserts and Shields:
   1. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   2. Insert location: Between support shield and piping and under the finish jacket.
   3. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   4. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

V. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

W. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with aluminum jacket.

X. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.04 INSULATION WETTED DURING CONSTRUCTION:

A. Contractor shall replace any and all insulation wetted during construction at his own expense.

3.05 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
   1. Seal penetrations with flashing sealant.
   2. Extend jacket of outdoor insulation outside roof flashing at least 6 inches below top of roof flashing.
   3. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   1. Seal penetrations with flashing sealant.
   2. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
   3. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
   1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:
   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.06 SCHEDULE

A. Refrigerant Suction Lines and Liquid Lines: "Flexible Elastomeric", 1" thick. Jacket outdoor and exposed indoor piping with aluminum jacket.

B. AC Unit Drain Lines: "Flexible Elastomeric", 3/4" thick. Jacket outdoor and exposed indoor piping with aluminum jacket.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct liner.

C. Insulation jackets.

1.02 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of experience.

C. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.05 SCHEDULING

A. Schedule insulation application after pressure testing ductwork systems that are specified to be pressure tested. Insulation application may begin on segments that have satisfactory test results.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Building shall be at a state of construction to prevent rain water from coming in contact with insulation that is installed on ductwork or stored on site.

C. Maintain temperature during and after installation for minimum period of 24 hours.

1.07 DEFINITIONS

A. Exposed: Exposed to view when construction is complete. Items which are not "exposed" are "concealed".

B. Attic: Any space that is between an insulated ceiling and a non-insulated roof.

C. Exterior: Any space that is external to the conditioned building envelope.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Comply with NFPA 90A.

B. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE WRAP

A. Manufacturer:
   1. Johns Manville
   2. Knauf Insulation
   3. Owens Corning Corporation
   4. CertainTeed Corporation

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.29 Btu*in/(hr*ft^2*°F) at 75°F.
   2. Installed 'R' value: 2.2” thick (R-6.0), 3” thick (R-8.3).
   3. Maximum Service Temperature: 250°F.
   4. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 GLASS FIBER, RIGID BOARD

A. Manufacturer:
   1. Johns Manville
   2. Knauf Insulation
   3. Owens Corning Corporation
   4. CertainTeed Corporation

B. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. 'K' Value: 0.23 Btu*in/(hr*ft^2*°F) at 75°F.
   2. Installed 'R' value: 1.5” thick (R-6.5), 2” thick (R-8.7).
   3. Maximum Service Temperature: 450°F.
   4. Maximum Water Vapor Absorption: 5.0 percent.
   5. Maximum Density: 6 lb/cu ft.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch when tested in accordance with ASTM E96.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.04 JACKETS

A. Aluminum Jacket: ASTM B209.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Indoor: Smooth. Outdoor: Stucco Embossed.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.05 DUCT LINER

A. Manufacturers:
   1. Johns Manville
   2. Knauf Insulation
   3. Owens Corning Corporation
   4. CertainTeed Corporation

B. Non-corrosive, incombustible glass fiber complying with ASTM C1071; rigid board, and preformed round liner board; impregnated surface and edges coated with acrylic polymer.
   1. Fungal Resistance: No growth when tested according to ASTM G21.
   2. Conductance: 1" Thick, maximum of 0.24 Btu*in/(hr*ft^2*°F) at 75°F.
   3. Service Temperature: Up to 250°F.
   4. Rated Velocity on Coated Air Side for Air Erosion: 6,000 fpm, minimum.

C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

D. Liner Fasteners: Galvanized steel, self-adhesive pad or impact applied with integral or press-on head.

2.06 FIRE BARRIER DUCT WRAP (FOR KITCHEN HOOD EXHAUST DUCTWORK)

A. Manufacturers:
   1. 3M – Fire Barrier Duct Wrap 615+
   2. Morgan Thermal Ceramics – FireMaster FastWrap XL
   3. Substitutions: See Section 016000 - Product Requirements.

B. Fire barrier duct wrap insulation shall be a high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized polyester foil. Duct wrap density shall be nominal 6 lb/cu ft and have a nominal 1-1/2 in. thickness. The duct wrap shall have a continuous use limit of 1832°F. The blanket thermal resistance (R-value) at ambient temperature shall be minimum 6.3. Smoke Developed Index and Flame Spread Index of the bare blanket, and of the foil encapsulated blanket shall be 0/0. The foil encapsulation shall be bonded to the core blanket material.

C. Fungal Resistance: No growth when tested according to ASTM C1338.

D. Service Temperature: Up to 250°F.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulate all items subject to sweating or loss of heat.

D. Repair existing insulation at points of connection to existing work.

E. Insulated ducts conveying air below & above ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, registers, diffusers, fire dampers, flexible connections, and expansion joints.

F. Exterior Applications: “Glass Fiber, Rigid Board”. Provide insulation board with vapor barrier jacket. Secure board with weld pins and speed clips 12" on centers. Seal clip indentations with mastic. Seal all joints and seams with mastic. Cover with calked aluminum jacket with seams located on bottom side of horizontal duct section. Slope top of rigid board & jacket so that rain will not stand on top side of duct.

G. “Glass Fiber, Flexible Wrap” Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive/mastic.

5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
6. On rectangular and flat oval ducts 30" wide and wider, additionally support insulation with weld pins and speed clips 18" on centers. Seal weld pins with mastic and FSK tape.

H. “Duct Liner” Application:
1. Apply in accordance with SMACNA "Duct Liner Application Standard" over full coverage adhesive. Coat all edges with adhesive and seal all punctures or tears with mastic before installing ducts. Cut liner to assure overlapped and compressed longitudinal corner joints. Fasteners shall be sized appropriately for thickness of liner utilized. Provide mechanical fasteners and metal nosings as noted below:

a. For all velocities, provide metal nosings on upstream edge of liner at connections to equipment: Fans, coils, dampers, AC Units, sound absorbers, etc.

b. For velocities up to 2,000 feet per minute: Start fasteners within 3" of the upstream transverse edges of the liner and 3" from the longitudinal joints and space them a maximum of 12"o.c. around the perimeter of the duct, except that they may be a maximum of 12" from a corner break. Elsewhere locate fasteners a maximum of 18" o.c., except that they shall be placed not more than 6" from a longitudinal joint of the liner nor more than 12" from a corner break.

c. For velocities from 2,001 to 4,000 feet per minute: Start fasteners within 3" of the upstream transverse edges of the liner and 3" from the longitudinal joints and space them a maximum of 6" o.c. around the perimeter of the duct, except that they may be a maximum of 6" from a corner break. Elsewhere locate fasteners a maximum of 16" o.c., except that they shall be placed not more than 6" from a longitudinal joints of the liner nor more than 12" from a corner break. In addition to the adhesive edge coating of transverse joints, coat and longitudinal joints with adhesive.

d. For velocities from 4,001 to 6,000 feet per minute: Same as 2 above except that metal nosing shall be installed to secure liner at all upstream transverse edges.

I. **Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.**

3.03 INSULATION WETTED DURING CONSTRUCTION:

A. Contractor shall replace any and all insulation wetted during construction at his own expense.

3.04 SCHEDULES

A. Air Terminal Devices:
1. Ceiling Mounted Supply Diffusers: 2.2” thick “Glass Fiber, Flexible Wrap”. Seal edges to diffuser, do not tape insulation to ceiling grid.
2. Fire Dampers for internally lined ductwork: 2.2” thick “Glass Fiber, Flexible Wrap”. Seal edges to the wall. Do not penetrate wall, floor, or partition with insulation.

B. Low Pressure Ductwork:
1. Rectangular Supply Duct: 2.2" thick “Glass Fiber, Flexible Wrap”.
2. Rectangular Return & Relief Duct: 2.2" thick “Glass Fiber, Flexible Wrap”.
3. Rectangular Exhaust Duct, first 25 feet from Exhaust Fan: 1” thick “Duct Liner”.
4. Rectangular Outside Air Duct: 2.2" thick “Glass Fiber, Flexible Wrap”.
5. Mixed air plenums in mechanical rooms: 1” thick “Duct Liner” and 2" thick “Glass Fiber, Rigid Board”,
6. All round concealed ductwork: 2.2" thick “Glass Fiber, Flexible Wrap”.
7. Ductwork routed in Attic Space (routed in trusses of gym): 3” thick “Glass Fiber, Flexible Wrap”. Seal all joints & seams with mastic.

C. Ductwork located Outdoors:
   1. Ducts located outdoors: 2" thick “Glass Fiber, Rigid Board”, seal all joints & seams with mastic, provide aluminum jacket around entire duct & slope insulation on top side of duct to shed water. Slope insulation and jacket away from building.

D. Manufactured Oval and Round ductwork:
   1. Flat Oval and Round Supply Duct: 1” liner and perforated inner shell.

E. Miscellaneous:
   1. Conical and straight spin ins on both lined and unlined ducts shall be insulated with 2.2" thick “Glass Fiber, Flexible Wrap”. Insulation shall be slit at damper rods, at spin ins and sealed vapor tight.
   2. Ducts located in mechanical rooms up to 10’-0” a.f.f.: 2" thick “Glass Fiber, Rigid Board”, seal all joints & seams with mastic.

END OF SECTION

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING - SECTION 15116

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.02 SUBMITTALS

A. Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years experience.
   2. Approved by manufacturer.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Manufacturers:
   1. Flexicraft Industries
   2. Substitutions: See Section 016000 - Product Requirements.

B. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
   4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Below Grade Exterior Walls:
   1. Zinc coated or cast iron pipe.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

G. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Engineer.

H. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Advance Products & Systems, LLC.
   2. Flexicraft Industries; PipeSeal
   3. Substitutions: See Section 016000 - Product Requirements.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

E. Structural Considerations:
   1. Do not penetrate building structural members unless indicated.

F. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
   2. Aboveground Piping:
      a. Pack solid using mineral fiber in compliance with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
   3. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

G. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.

H. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment drains.

B. Pipe hangers and supports.

1.02 SUBMITTALS

A. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Provide manufacturers catalogue information.
   3. Joining materials.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Installer Qualifications:
   1. Company specializing in performing work of the type specified in this section, with minimum three years of experience.
   2. Installers of Pressure-Sealed Joints: Installers shall be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.

C. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

D. Date stamp all castings used for coupling housings, fittings, valve bodies, etc. for quality assurance and traceability.

E. Coupling Manufacturer:
   1. Perform on-site training by factory-trained representative to the Contractor's field personnel in the proper use of grooving tools and installation of grooved joint products.
   2. Periodic job site visits by factory-trained representative to ensure best practices in grooved joint installation.
   3. A distributor's representative is not considered qualified to perform the training.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Contractor's option, PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

C. ABS Pipe: ASTM D2680.
   1. Fittings: Compatible with piping material.
   2. Joints: Solvent welded with ASTM D2235 cement.

2.02 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable adjustable, clevis.
   3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
   5. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
   6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
   8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   9. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
   10. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
   11. Vertical Support: Steel riser clamp.
   12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   14. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
   15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   16. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   17. Inserts: Threaded Rod Hangers or Drop-In anchors, malleable iron case ofgalvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems.

3.02 PIPE JOINT CONSTRUCTION:

1. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
2. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.
3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

4. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
5. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
6. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
   c. PVC Pressure Piping: Join ASTM D 1785 schedule number, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule number PVC pipe and socket fittings according to ASTM D 2855.
   d. PVC Nonpressure Piping: Join according to ASTM D 2855.
7. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
8. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.
9. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.
10. Pressure-Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.

3.03 INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Shop Drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install in accordance with manufacturer's instructions.

E. Install heating water, glycol, chilled water, condenser water, non-potable, and boiler blowdown piping to ASME B31.9 requirements. After installation test all systems per ASME B31.9 at 1.5 times the system pressure.

F. Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to ASME B31.9 requirements.

G. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

H. Install piping to conserve building space and to avoid interfere with use of space. Route piping as high as practical and not on floors unless otherwise indicated. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Install piping to allow application of insulation. Install piping free of sags and bends.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing valves.

K. No mitering or notching for fittings permitted. Weldolets permitted where branch size is two pipe sizes smaller than main. 45 degree saddles permitted where shown. Use long radius ells unless otherwise noted.

L. Provide drain traps for AC Unit drain pans. Size traps as required to drain under operating conditions. Provide drain on low side of drain traps for draining of traps during winter months.

M. Group piping whenever practical at common elevations.

N. Sleeve pipe passing through partitions, walls and floors. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place. Extend sleeves 1-1/2" above finish floor and waterproof.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.
   1. For uninsulated pipe through fire rated walls or partitions or floors outside chases: Pipe Shields, Inc., Model WFB or approved equal at walls, Model DFB at floors.
   2. For insulated pipe passing through fire rated partitions or walls or floors outside chases: Pipe Shields, Inc., Model WFB-CS for hot lines, VFB-CS-CW for cold lines. Insulation: Calcium silicate for hot lines and foamglass for cold lines, thickness specified for adjacent pipe covering.
   3. At Contractor's option, instead of the factory fabricated sleeves specified above for pipe passing through floors and fire rated walls and partitions substitute 20 gauge galvanized steel sleeve 1/2" larger in diameter than pipe or pipe covering and seal both ends of sleeve with 3M Branch Fire Barrier Caulk CP25 or Putty 303, thickness and application in strict accord with manufacturer's recommendations, minimum thickness 1". Where pipe is insulated, insulation shall be continuous thru sleeve, calcium silicate for hot lines and foamglass for cold lines. In exposed areas, after product has dried it shall be sanded smooth for painting under painting section.

P. Slope piping and arrange to drain at low points.

Q. Make threaded joints with teflon tape.

R. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.

S. Install 3/4" ball or gate valve drains with hose adapters at low points of water piping and at bases of all risers or where shown.

T. Make connections to equipment using screwed unions in sizes 2" and smaller and flanged unions in sizes 2 1/2" and larger. Install unions in all piping connections to each piece of equipment. Provide rubber grommets at pipe penetrations to equipment casings.

U. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulation unions or couplings, equal to EPCO.

V. Provide reduced pressure principal backflow preventers as indicated on plans or verify that plumbing contractor is providing. Make final connections to equipment/piping under HVAC work. Note that all piping and insulation downstream of backflow preventer must be painted yellow.

W. Lay underground pressure piping so top of pipe is at least 18" below finished grade. Support all underground piping solidly along body of pipe.

X. Pipe shall be braced at flexible connections to prevent blowouts under operating conditions.

Y. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two (2) wrappings of polyvinyl chloride tape.

Z. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

AA. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
   1. Flexible couplings may be used in header piping to accommodate thermal growth, thermal contraction in lieu of expansion loops.
   2. Use flexible couplings in expansion loops.

BB. Grooved Joints:
   1. Install in accordance with the manufacturer's latest published installation instructions.

2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.

CC. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

DD. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

EE. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

FF. Provide access where valves and fittings are not exposed.

GG. Use eccentric reducers to maintain top of pipe level.

HH. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

II. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.

JJ. Install valves with stems upright or horizontal, not inverted.

3.04 PIPE HANGERS AND SUPPORTS:

A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC" for seismic restraints.

C. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.

D. Support horizontal piping as scheduled.

E. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.

F. Place hangers within 12 inches (300 mm) of each horizontal elbow.

G. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

H. Support vertical piping at everyother floor. Support riser piping independently of connected horizontal piping. Provide neoprene isolators between pipe and riser clamp.

I. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

J. Provide copper plated hangers and supports for copper piping.

K. Prime coat exposed steel hangers and supports. Refer to Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide stainless steel or plastic coated hangers in Pool areas subject to chlorine atmosphere.

M. Equip pipe hangers for 8" pipe and larger, located in Mechanical Rooms, with 1" static deflection combination elastomeric spring hangers.

N. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.

3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

3.05 SCHEDULES

A. Hanger Spacing for Copper Tubing.
1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
4. 2-1/2 inch: Maximum span, 9 feet; minimum rod size, 3/8 inch.
5. 3 inch : Maximum span, 10 feet; minimum rod size, 3/8 inch.
6. 4 inch: Maximum span, 10 feet; minimum rod size, 1/2 inch.

B. Hanger Spacing for Steel Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
6. 3 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
7. 4 inches: Maximum span, 10 feet; minimum rod size, 1/2 inch.

C. Hanger Spacing for Plastic Piping.
1. 1/2 inch: Maximum span, 42 inches; minimum rod size, 1/4 inch.
2. 3/4 inch: Maximum span, 45 inches; minimum rod size, 1/4 inch.
3. 1 inch: Maximum span, 51 inches; minimum rod size, 1/4 inch.
4. 1-1/4 inches: Maximum span, 57 inches; minimum rod size, 3/8 inch.
5. 1-1/2 inches: Maximum span, 63 inches; minimum rod size, 3/8 inch.
6. 2 inches: Maximum span, 69 inches; minimum rod size, 3/8 inch.

END OF SECTION

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

C. Liquid Indicators:
   1. Use line size liquid indicators in main liquid line leaving condenser.
   2. If receiver is provided, install in liquid line leaving receiver.
   3. Use line size on leaving side of liquid solenoid valves.

D. Valves:
   1. Use service valves on suction and discharge of compressors. Provide tamper resistant caps and provide tools necessary to user/owner to unlock caps.
   2. Use gage taps at compressor inlet and outlet.
   3. Use gage taps at hot gas bypass regulators, inlet and outlet.
   4. Use check valves on compressor discharge.
   5. Use check valves on condenser liquid lines on multiple condenser systems.

E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.

F. Filter-Driers:
   1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
   2. Use a filter-drier on suction line just ahead of compressor.
   3. Use sealed filter-driers in lines smaller than 1/2 inch outside diameter.
   4. Use sealed filter-driers in low temperature systems.
   5. Use sealed filter-driers in systems utilizing hermetic compressors.
   6. Use replaceable core filter-driers in lines of 1/2 inch outside diameter or greater.
   7. Use replaceable core liquid-line filter-driers in systems utilizing receivers.
   8. Use filter-driers for each solenoid valve.

G. Solenoid Valves:
   1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.
   2. Use in liquid line of single or multiple evaporator systems, and hot gas bypass lines.
   3. Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

1.02 SUBMITTALS

A. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity. For each type of valve, refrigerant piping, and piping specialty.
   1. Include pressure drop, based on manufacturer's test data, for the following:
      a. Thermostatic expansion valves.
      b. Solenoid valves.
      c. Hot-gas bypass valves.
      d. Filter dryers.
      e. Strainers.
      f. Pressure-regulating valves.

B. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

C. Test Reports: Indicate results of leak test, acid test, and evacuation test.

D. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.

E. Submit welder’s certification of compliance with ASME Boiler and Pressure Vessel Code-Section IX.

F. Installer's Qualification Statement.

G. Field quality-control reports.

1.03 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

1.04 MAINTENANCE

A. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Filter-Dryer Cartridges: One of each type and size.
   2. Refrigeration Oil Test Kits: One, each containing everything required to conduct one test.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work.

B. Designer Qualifications: Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

D. Comply with ASHRAE 15, “Safety Code for Refrigeration Systems.”

E. Comply with ASME B31.5, “Refrigeration Piping and Heat Transfer Components.”

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.

B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 for installation of piping system.

B. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.

C. Welders Certification: In accordance with ASME BPVC-IX.

D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

2.02 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-134a:
   1. Suction Lines for Air-Conditioning Applications: 115 psig.
   2. Suction Lines for Heat-Pump Applications: 225 psig.
   3. Hot-Gas and Liquid Lines: 225 psig.

B. Line Test Pressure for Refrigerant R-407C:
   1. Suction Lines for Air-Conditioning Applications: 230 psig.
   2. Suction Lines for Heat-Pump Applications: 380 psig.
   3. Hot-Gas and Liquid Lines: 380 psig.

C. Line Test Pressure for Refrigerant R-410A:
   1. Suction Lines for Air-Conditioning Applications: 300 psig.
   2. Suction Lines for Heat-Pump Applications: 535 psig.
   3. Hot-Gas and Liquid Lines: 535 psig.

2.03 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy.

B. Pipe Supports and Anchors:
   1. Provide hangers and supports that comply with MSS SP-58.
      a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
   7. Vertical Support: Steel riser clamp.
   8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   10. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   11. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 MOISTURE AND LIQUID INDICATORS

A. Manufacturers:
   1. Henry Technologies; www.henrytech.com/#sle.
   2. Parker Hannifin/Refrigeration and Air Conditioning; www.parker.com/#sle.
   3. Sporlan, a Division of Parker Hannifin; www.parker.com/#sle.

B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.05 VALVES

A. Manufacturers:
   1. Hansen Technologies Corporation; www.hantech.com/#sle.
   2. Henry Technologies; www.henrytech.com/#sle.
   3. Flomatic Valves; www.flomatic.com/#sle.

B. Service Valves:
   1. Forged brass body with copper stubs, tamper proof brass caps, removable valve core, flared or solder ends, for maximum pressure of 500 psi.

2.06 FILTER-DRIERS

A. Manufacturers:
   1. Flow Controls Division of Emerson Electric; www.emersonflowcontrols.com/#sle.
   2. Parker Hannifin/Refrigeration and Air Conditioning; www.parker.com/#sle.
   3. Sporlan, a Division of Parker Hannifin; www.parker.com/#sle.

B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina,activated charcoal, and filtration to 40 microns; of construction that will not pass into refrigerant lines.

C. Construction: UL listed.
   1. Replaceable Core Type: Steel shell with removable cap.

2. Sealed Type: Copper shell.
3. Connections: As specified for applicable pipe type.

D. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

2.07 ENGINEERED WALL SEALS AND INSULATION PROTECTION

A. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
a. Elastomeric Sleeve Diameter: 1-11/16 inch.
2. Wall Outlet Size, Siding and Compact Applications: 6-7/8 inch wide by 3-7/8 inch high.
a. Elastomeric Sleeve Diameter: 1-11/16 inch.
3. Outlet Cover Color: Gray.
4. Water Penetration: Comply with ASTM E331.
5. Air Leakage: Comply with ASTM E283.
6. Air Permeance: Comply with ASTM E2178.

B. Insulation Protection System: Mechanical line insulation and PVC cover.
1. PVC Insulation Cover Color: Black with full-length velcro fastener.
2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
5. Flame Spread and Smoke Development Rating of 25/450: Comply with ASTM E84.
6. Adhesive free.

2.08 REFRIGERANT TUBING KITS

A. Furnished by split system manufacturer.

B. Factory-rolled and -bundled, soft-copper tubing with tubing termination fittings at each end.

C. Standard one-piece length for connecting to indoor units.

D. Pre-insulated with flexible elastomeric insulation of thickness to comply with governing energy code and sufficient to eliminate condensation.

E. Factory Charge: Nitrogen

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 GENERAL INSTALLATION

A. Provide clearance for installation of insulation and access to valves and fittings.

B. Provide access to concealed valves and fittings.

C. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

D. Fully charge completed system with refrigerant after testing.

E. Provide electrical connection to solenoid valves.

F. Install sleeves for piping penetrations of walls, ceilings, and floors.

G. Install sleeve seals for piping penetrations of concrete walls and slabs.

H. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.03 VALVE AND SPECIALTY INSTALLATION

A. Install valves in suction and discharge lines of compressor.

B. Install service valves for gage tapes at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

D. Except as otherwise indicate, install valves on inlet and outlet side of filter dryers.

E. Install refrigeration specialties in accordance with manufacturer's instructions.

F. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

G. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

3.04 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping to conserve building space and avoid interference with use of space.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Install piping adjacent to machines to allow service and maintenance. Install piping free of sags and bends.

E. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Joints:
   1. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
   2. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
      a. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
      b. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.
   3. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and to restore full ID. Join pipe fittings and valves as follows:
      a. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
      b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
   4. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.
   5. Welded Joints: Construct joints according to AWS D10.12M/D10.12.
   6. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

I. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

J. Flood piping system with nitrogen when brazing.

K. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

L. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.

M. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

N. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.

O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

3.05 PIPE HANGERS AND SUPPORTS:

A. Install in accordance with ASME B31.5.

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place hangers within 12 inches of each horizontal elbow.

D. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

F. Provide rubber in shear isolators at hangers/anchors.

3.06 FIELD QUALITY CONTROL

A. Test refrigeration system in accordance with ASME B31.5.

B. Pressure test system with dry nitrogen to not less than the pressures indicated in “Performance Requirements” Article for 24 hours. Perform final tests at 27 inches vacuum and 200 psi using electronic leak detector. Test to no leakage.

C. Prepare test and inspection reports.

3.07 SYSTEM CHARGING

A. Charge system using the following procedures:
   1. Install core in filter dryers after leak test but before evacuation.
   2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
   3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
   4. Charge system with a new filter-dryer core in charging line.

3.08 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-3/8 inch OD: Maximum span, 6 feet; minimum rod size, 3/8 inch.
   4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   6. 2-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.

END OF SECTION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and equipment schedules.

1.02 REFERENCED CODES & STANDARDS

A. The following codes and standards are referenced through out. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.
   1. ASHRAE Standards 62 & 52
   2. National Electric Code NFPA 70
   3. UL 867 including ozone chamber test required as of December 21, 2007

1.03 RELATED WORK

A. Testing, Adjusting and Balancing

B. Facility Access and Protection

C. Ductwork

D. Filters

E. Water and Refrigerant Piping

F. Electrical Wiring

G. Control Wiring

1.04 QUALITY ASSURANCE

A. Basis of design is Top Product Innovations. Global Plasma Solutions and Phenomenal Aire shall be considered equal subject to meeting all specifications herein.

B. The Air Purification System shall be a product of an established manufacturer within the USA.

C. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.

D. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable.

E. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2013 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted.

F. The Air Purification System have been tested by UL or Intertek/ETL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December 21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers shall submit their independent UL 867 test data with ozone results to the engineer during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.

G. The maximum allowable ozone concentration per the UL 867-2007 chamber test shall be 0.007 PPM. The maximum peak ozone concentration per the UL 867-2007 peak test as measured 2

inches away from the electronic air cleaner's output shall be no more than 0.0042 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for ion generators including:
   1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
   2. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.
   3. Performance data for each type of plasma device furnished.
   4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2013 to validate acceptable indoor air quality at the quantity of outside air scheduled (when projects are designed with outside air reduction).
   5. Product drawings detailing all physical, electrical and control requirements.
   6. Copy of UL 867 independent ozone test.

B. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.

B. Store in original cartons and protect from weather and construction work traffic.

C. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.07 WARRANTY

A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of twenty-four months after shipment, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

PART 2 PRODUCTS

2.01 GENERAL

A. The air purification system(s) shall be of the size, type, arrangement, and capacity indicated and required by the unit furnished and shall be of the manufacturer specified.

B. Basis of Design: Top Product Innovations Type C unit.

C. All other Suppliers of comparable products requesting prior approval shall:
   1. Submit for prior approval in accordance with the requirements of Section 15010.
   2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2013 calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application shall also be included.
   3. Submit independent test data from ETL or UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.

2.02 BI-POLAR IONIZATION & PERFORMANCE CRITERIA

A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.

B. The Bi-polar Ionization system shall be capable of:
   1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).

2. Controlling gas phase contaminants generated from human occupants, building structure and furnishings.
3. Capable of reducing static space charges.
4. Increasing the interior ion levels, both positive and negative, to a minimum of 800 ions/cm³ measured 5 feet from the floor.

C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable.
1. Air exchange rates may vary through the full operating range of a constant volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
2. Velocity Profile: The air purification device shall not have maximum velocity profile.

D. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration, or dangerous conditions within the air purification system. Air purification system shall be capable of wash down duty.

E. Equipment Requirements:

F. Electrode Specifications (Bi-Polar Ionization):
1. Each Plasma Generator with Bi-polar Ionization output shall include the required number of electrodes and power generators sized to the air handling equipment capacity. Unit shall be capable of treating 6,000 CFM (C6.0) or 10,000 CFM (C10.0). Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, performance output reduction over time, ozone production and corrosion.
2. Electrodes shall be energized when the main unit disconnect is turned on and the fan is operating. Electrodes shall be made from carbon fiber to prevent oxidation over time.
3. Electrode pair shall provide a minimum of 140 million ions per cubic centimeter (C6.0) or 200 million ions per cubic centimeter (C10.0), both positive and negative ions in equal quantities. Devices providing less than the rated ion densities shall not be acceptable.

G. Air Handler Mounted Units: Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available. Each unit shall be designed with an integral illuminated LED and dry contacts to prove ion output is operating properly. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per AHU is required to interface to the BAS or the optional DDC controller. Dry contacts proving power has been applied in lieu of the ion output is actually operating, are not acceptable.

H. Plenum/Duct Mounted Units: Where so indicated on the plans and/or schedules, Plasma Generators(s) shall be supplied and installed. The generator shall be installed through the duct wall and into the air stream with the external power head in a convenient location for visual indication of power, removal and servicing, by the mechanical contractor. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per duct is required to interface to the BAS or the optional DDC controller.

I. Ionization Requirements:
1. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.
a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed and powered by 24VAC.
b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced. Imbalanced levels shall not be acceptable.

c. Ionization output from each electrode shall be a minimum of 140 million ions/cc (C6.0) and 200 million ions/cc (C10.0) when tested at 1" from the ionization generator.

d. All manufacturers shall provide documentation by an independent NELEC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:

1) MRSA - >96% in 30 minutes or less
2) E.coli - > 99% in 15 minutes or less
3) TB - > 69% in 60 minutes or less
4) C. diff - >86% in 30 minutes or less

Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELEC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable

2. Ozone Generation: The operation of the electrodes or Bi-polar ionization units shall conform to UL 867-2007 with respect to ozone generation. There shall be no ozone generation during any operating condition, with or without airflow.

J. Electrical Requirements:

1. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

K. Controls Requirements:

1. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset.
2. Integral airflow sensing shall modulate the Plasma output as the air flow varies or stops. A mechanical air flow switch shall not be acceptable as a means to activate the Plasma device due to high failure rates and possible pressure reversal.
3. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown or the plans. The contractor shall follow all manufacturer IOM instructions during installation.
4. All Plasma devices shall have a means to interface with the BAS system. Dry contacts shall be provided to prove there are ions being produced. Systems providing indication that power is applied to the Plasma device, but not directly sensing the power at the ion output, shall not be acceptable.
5. Plasma systems that use multiple modules with ion output alarm wires wired to the same terminal such that all ion modules must fail to show an alarm status shall not be acceptable.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

3.02 ASSEMBLY & ERECTION: PLASMA GENERATOR WITH BI-POLAR IONIZATION

A. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.

B. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.

C. All equipment shall be protected from dust and damage on a daily basis throughout construction.

3.03 TESTING

A. Provide the manufacturers recommended electrical tests.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following plumbing identification materials and their installation:
   1. Pipe markers.
   2. Valve tags.
   3. Valve schedules.
   4. Equipment labels.
   5. Warning signs and labels.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Valve numbering scheme.

C. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

1.03 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.04 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
   1. Colors: Comply with ASME A13.1, unless otherwise indicated.
   2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
   3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
   4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.

5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pre-tensioned Pipe Markers: Pre-coiled semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Self-Adhesive Pipe Markers: Are not allowed

2.02 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme approved by Architect. Provide 5/32-inch hole for fastener.
1. Material: 3/32-inch thick laminated plastic with 2 black surfaces and white inner layer.
2. Valve-Tag Fasteners: Brass wire-link chain, beaded chain or S-hook.

2.03 VALVE SCHEDULES

A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
2. Frame: Extruded aluminum.
3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

2.04 EQUIPMENT LABELS

A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Color Coding:

System	Background Color	Letters
Other equipment	Black	White

3. Temperatures up to 160 deg F.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Letter shall be a minimum of 1/2” high. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless-steel self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

2.05 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: Minimum 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information as indicated elsewhere in the specifications and on the Drawings.

PART 3 - EXECUTION

3.01 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.02 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
   1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pre-tensioned pipe markers. Use size to ensure a tight fit.
   2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, [**at least ¾ inch**] [**1-1/2 inches**] wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
   3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
   4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.

B. Locate pipe markers and color bands where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:
   1. Near each valve and control device.
   2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
   3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
   4. At access doors, manholes, and similar access points that permit view of concealed piping.
   5. Near major equipment items and other points of origination and termination.
   6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
   7. Label 2 psi gas piping at 6 foot intervals.

3.03 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
   1. Valve-Tag Size and Shape:
      a. Cold Water: **2 inches square**.
      b. Hot /HWR Water: **2 inches square**.
      c. Fire Protection: **2 inches square**.
      d. Gas: **1-1/2 inches round**.
   2. Valve-Tag Color:
      a. Cold Water: **Natural**.
      b. Hot Water: **Blue**.
      c. Fire Protection: **Red**.
      d. Gas: **Yellow.**
   3. Letter Color:
      a. Cold Water: White
      b. Hot Water: **White**.
      c. Fire Protection: **White**.
      d. Gas: **White**.

3.04 VALVE-SCHEDULE INSTALLATION

A. Mount valve schedule on wall in accessible location in each major equipment room.

END OF SECTION 15405

1.00 GENERAL:

1.01 SCOPE:

A. Provisions of this Section apply to all Plumbing and Fire Protection work.

B. Include the provisions of General, Supplementary and Special Conditions and provisions of the Specifications shall apply to and form a part of this Section.

C. Provide all labor, materials, equipment, and services necessary for the completion of all work shown or specified, except work specifically specified to be done or furnished under other sections of the Specifications. Include performing all operations in connection with the complete installation in strict accordance with the specification and applicable drawings subject to the terms and conditions of the Contract, for the following system:

1. A system of sanitary waste and vent piping.

2. A system of domestic water piping.

3. A system of natural gas piping.

4. A system of fire protection piping.

D. Give required notices, file drawings obtain and pay for permits, deposits and fees necessary for the installation of the work. Obtain and pay for inspections required by laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspections, and file such certificates with Owner.

E. "Provide" means to furnish and install, complete and ready for operation.

1.02 DRAWINGS:

A. Drawings are diagrammatic and subject to requirements of Architectural Drawings. Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work**.** Coordinate with Architectural, Structural, Electrical, HVAC and other Building Drawings.

B. Follow the Drawings closely, check dimensions with Architectural Drawings and field conditions. DO NOT scale Drawings for location of system components.

C. Make no changes without Architect's written permission. In case of doubt, obtain Architect's decision before proceeding with work. Failure to follow this instruction shall make the Contractor liable for damage to other work and responsible for removing and repairing defective or mis-located work.

D. Do not scale Drawings to locate sprinkler heads. Coordinate with lighting, ceiling grids, ceiling diffusers and/or reflected ceiling plans. Install Sprinkler Heads in center of ceiling tiles.

1.03 APPLICABLE CODES AND STANDARDS:

A. Comply with the current editions of the following Codes and Standards:

1. ANSI/ASHRAE 15 - Code for Building Services Piping.

2. NFPA 70 - National Electrical Code.

3. NFPA 101 – National Life Safety Code.

4. Other Standards as referenced in other Sections of Division 15.

5. Local Building Code (International Building Code if no local Building Code in effect).

6. Local Plumbing Code (International Plumbing Code if no local Plumbing Code is in effect).

7. Local gas code (International Gas Code if no local code is in effect).

8. NFPA 13 - Sprinkler System installation.

9. NFPA 24 – Installation of Private Fire Service Mains.

10. NFPA 110 - Emergency and standby power.

13. NFPA 72 - National Fire Alarm and Signaling Code.

1.04 QUALIFICATIONS OF SUBCONTRACTOR:

A. The Plumbing Contractor shall meet the following qualifications:

1. The Plumbing Contractor must be approved by the Architect.

2. The Plumbing Contractor shall have been in business as a Plumbing Contractor for at least three (3) years prior to Bid Date. He shall have a current Master's Plumber's Certificate and Gas Certificate of competency issued by the State of Alabama and the city and county in which work occurs.

3. The Plumbing Contractor shall have a satisfactory experience record with Plumbing installations of character and scope comparable with this project, and for at least three (3) years prior to the Bid Date and shall have had an established service department capable of providing service inspection or full maintenance contracts.

B. The Fire Protection Sub-Contractor shall meet the following qualifications:

1. The Fire Protection Contractor shall be approved by the Architect,

2. The Fire Protection Contractor shall have been in business as a Fire Protection Contractor for at least three (3) years prior to the Bid date and shall be licensed by the State, County and City in which the work will be performed.

3. The Fire Protection Contractor shall have a satisfactory experience record with Fire Protection installations of character and scope comparable with this project and shall have completed three (3) such installations in the past three (3) years.

4. The Fire Protection Contractor shall be a Registered Engineer in the State in which the work occurs or be a Nicet Level 3.

5. The Fire Protection Contractor shall be the employer of the NICET Level 3 Designer. The NICET Level 3 designer will oversee installation and provide in closeout documentation.

1.05 CONFLICTS AND INTERFERENCES:

A. If systems interfere or conflicts, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.06 WORKMANSHIP:

A. Do all work in a neat and first-class manner. Remove and replace work not done in such manner as directed by the Architect.

1.07 COOPERATION:

A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.08 VISITING SITE:

A. Visit site and become familiar with location and various conditions affecting work. No additional allowance will be granted because of lack of knowledge of such conditions.

2.00 PRODUCTS:

2.01 MATERIALS, SUBSTITUTIONS AND SUBMITTALS:

A. Unless otherwise noted, provide new, standard, first-grade materials throughout. Equipment and materials furnished shall be fabricated by manufacturers regularly engaged in their production and shall be the standard and current model for which replacement parts are available. Equipment shall be substantially the same equipment of a given manufacturer which has been in successful commercial use and operation for at least three (3) years.

B. Where materials or products are specified by manufacturer's name, brand, trade name, or catalog reference, such named materials or products shall be the basis of the Bid, without substitution, and shall be furnished under the Contract unless requests for substitutions are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.

C. Substitutions will be considered only if written request for approval has been received by the Architect TEN (10) DAYS prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which substitution is proposed and a complete description of the proposed substitute including drawings, cuts, performance and test data, samples and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute may require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution is final.

D. If the Architect approves any proposed substitution prior to receipt of Proposals, approval will be set forth in an Addendum. DO NOT rely upon approvals made in any other manner.

E. No substitutions will be considered after the Contract has been executed, except as described in the General Conditions.

F. Submittal data and shop drawings, shall be submitted at one time, partial submittals will not be considered. Within 30 days of execution of Contract and before ordering materials and equipment, submit to Architect and obtain his approval of a detailed list showing each item which is to be furnished by make, trade name, catalog number, or the like; together with manufacturer's specifications, certified prints, and other data sufficient for making comparisons with items specified. When approved, such schedule shall be of equal force with these specifications in that no variation there from shall be allowed except with Architect's written approval. Number of Shop Drawings and procedure shall be as directed by the Architect.

G. All pressure vessels shall be constructed and tested in accordance with applicable ASME Codes and shall bear ASME stamps. Certificates of inspection and approval shall be submitted to Architect.

H. Similar items of equipment shall be the product of the same Manufacturer.

I. See section, "ALTERNATES" in other sections of the Specifications and Bid accordingly.

2.02 SHOP DRAWINGS:

A. Before starting work, submit and obtain approval of the following:

1. Equipment piping.

2. Plumbing Equipment, Products and Fixtures.

B. Thirty (30) days before starting work, submit Fire Protection Shop Drawings bearing the Seals of the Owner's underwriters and all governmental agencies having jurisdiction. Shop Drawings will not be considered without these seals. Complete shop drawings are required to be submitted at one (1) time.

1. Piping routing showing sizes, dimensions, elevations, and head locations (coordinate with reflected ceiling plan). Provide minimum six (6) sets of blue line drawings.

2. Provide a sprinkler head layout on a reflected ceiling plan. Indicate on plan all lights, HVAC ceiling air devices, smoke detectors, exit lights and any other ceiling attachments. Adjust locations of heads after Architectural review.

2.03 RECORD DRAWINGS:

A. When work starts obtain from Architect two (2) complete sets of white prints of the **Plumbing.** All corrections, variations, and deviations, including those required by change orders, if any, must be recorded in colored ink or colored pencil at the end of each working day on these drawings. The marked prints shall be available at all times for the Architect's inspection.

B. Prior to examining the request for final payment or making any response thereto, the Architect shall receive from the Contractor one (1) complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this Contract.

C. The Architect will forward the marked white prints to the Consulting Engineers for review. They will then be returned by the Architect to the Contractor for use in preparing record drawings.

D. When work is completed Contractor shall purchase from the Architect (At Architects' printing cost) one (1) set of reproducible electronic files and prints of Plumbing Drawings for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the dwg record drawings, removing all superseded data in order to show the actual completed conditions.

1. Accurately show location, size and elevation of new exterior piping work and its relationship to any existing piping and utilities, obstructions, etc., contiguous to the area of work.

2. Block out areas modified by change-order and identify them by change-order number.

2.04 ELECTRICAL EQUIPMENT:

A. Provide electrical equipment compatible with the current shown on electrical drawings. Verify current characteristics before ordering equipment.

B. Should the Contractor with the Architect's/Engineer's approval make changes in electrical equipment from those shown on the Electrical Drawings, he shall be responsible for the coordination and cost of required changes.

C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

D. Verify electrical characteristics of all equipment and voltages available with Electrical Section prior to ordering any electrical equipment.

2.05 SLEEVES:

A. Refer to the Architectural Life Safety Drawings for wall ratings and close all openings to match rating of wall.

B. Submit details of all pipe penetrations thru rated walls indicating wall construction, penetrating

material and method of closing penetration including materials and listing of detail.

C. All Penetrations thru walls are to be closed. If the wall is not rated, sheet rock joint compound may be used to close space around piping. For walls with ratings opening shall be closed with a U.L. Listed rating system compatible with wall rating. Insulation is to be continuous thru all openings.

D. For pipe through floors inside rated chases or through non-fire-rated walls: 20 gauge galvanized steel sleeve 1/2" larger than pipe or pipe covering. Pipe insulation to be continuous thru sleeve. Seal opening between sleeve and pipe or pipe covering

E. For uninsulated pipe through 2 hour fire rated walls, partitions or floors outside chases: Hilti FS605 with sleeve, U.L. Listing #WL1056.

F. For insulated pipe passing through fire rated partitions or walls or floors outside chases: Hilti #FS611A with no sleeve, U.L. Listing #WL5029. Insulation: 1" thick fiberglass continuous thru wall.

G. For pipe passing thru concrete floor, concrete walls, and concrete block walls:

1. Uninsulated Schedule 40 steel and copper: Hilti #FS605 with sleeve, U.L. #CAT1155.

2. Insulated Schedule 40 steel and copper: Hilti #FS611A, U.L. #CAT5045.

H. For 4" and smaller Schedule 40 PVC pipe passing thru 3 hour concrete floor, wall or concrete block wall - Hilti #FS611A with collar, UL System #CAJ095.

I. For 2" and smaller Schedule 40 PVC pipe penetrating a 1H12 concrete floor or wall - Hilti #FS611A sealant, UL #CAT2062 or UL #CAJ2066.

J. Under this Section, the Contractor shall be responsible for closing and making fire safe all openings exposed during construction (both new and existing) in the floor and deck above. Closing of opening shall be compatible with rating and shall not compromise the rating of the wall or floor being sealed.

K. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place.

L. In Mechanical Rooms extend sleeves 1-1/2" above finish floor and waterproof.

M. Where exposed pipes pass through walls and partitions in finished or exposed spaces, provide chrome plated F & C plates or escutcheons. Seal wall penetration and case work penetration with silicone prior to installing escutcheon.

N. All wall floor penetrations shall be closed in a neat manner. The method used to the close penetrations shall be compatible with the rating of the wall and shall in no way compromise the integrity of the partition or floor.

2.06 ACCESS DOORS:

A. Provide access doors for valves, and other items requiring maintenance located above hard ceilings or behind partitions or walls. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Provide door styles, sizes and colors as specified under the Architectural section.

B. Mark lay-in ceilings with paper brads at valve locations and maintenance access points. Bend ends of brads over above ceiling tile.

3.00 EXECUTION:

3.01 PROTECTION OF EQUIPMENT:

A. During construction all fixtures and equipment shall be protected from damage caused by weather,

masonry, plaster, paint and job accidents.

B. When installation is complete, clean equipment and make ready for painting. Adjust all flush valves.

3.02 INSTALLATION OF FIXTURES AND EQUIPMENT:

A. Install fixtures and equipment to provide normal service access to all components.

B. Provide sufficient space for removing components, install fixtures and equipment to provide such clearance.

C. Install fixtures and equipment in accordance with manufacturer's instructions. If manufacture's instructions conflict with contract documents, obtain Architect's decision before proceeding.

D. All fixtures and equipment shall be firmly fastened in place:

1. All wall hung fixtures shall be installed on a floor mounted fixture support with anchoring bolts in all holes of each leg. Bolts shall be sized as per manufacturer's recommendation.

3.03 CUTTING AND PATCHING:

A. Set sleeves and inserts and lay-out and form openings in walls, beams, girders and structural floors in this Section.

B. Cut, patch and repair as required to accomplish work and finish to match adjacent work. Architect's approval required before cutting any part where strength or appearance of finished work is involved.

C. Cutting, patching and repairing of walls, floors, etc., where noted in paragraph "A" above, have been located or sized incorrectly are included in this Section.

3.04 INCIDENTAL WORK:

A. All power wiring is included in Electrical Section.

B. Permanent drain and relief connections for **Plumbing Equipment** to nearest floor drain or to grade are included in this Section whether shown or not.

C. Items obviously omitted from drawings and/or specifications shall be called to attention of the Architect prior to submitting Bid, after award of Contract any changes or rearrangements necessary to complete Contract shall be at no additional cost to Owner.

3.05 FLASHING:

A. Vent Pipe and Roof Drain Flashing: Specified in "Architectural Roofing Section".

B. Coordinate all roofing penetrations with Roofing Section.

3.06 EXCAVATION AND BACKFILLING:

A. Include all excavation and backfilling required to bring the work to line and grade shown, including excavation of rock and all other materials which may be encountered.

B. Excavate trenches wide enough for proper installation of work. Grade trench bottoms evenly. Provide bell holes as necessary to insure uniform bearing for pipes. Excavate minimum 6" below pipe. Refill cuts below required pipe grade with sand or compacted gravel. Support pipe continuously along its entire length. Do not use piers to support piping.

C. Backfill after inspection by Architect and authorities having jurisdiction. Backfill compacted areas with "Engineered Fill", sand or fine gravel in accordance with requirements of "Sitework". Backfill paved areas with sand or fine gravel compacted to meet requirements of Paving Section. Backfill

shall be free of rock, wood, steel, brick, etc. Do not disturb pipe. Restore or repair pavements and the like after backfilling, to meet the requirements of the authority having jurisdiction.

3.07 DEMOLITION:

A. Refer to the Architectural Demolition Plans for areas to be demolished and remove all fixtures noted to be removed.

B. All fixtures and equipment noted "To Be Removed" on the drawings shall remain the property of the Owner. If Owner decides against retention of any or all items this Contractor shall remove from the site.

C. Where fixtures are removed, remove all abandoned or unused piping back to main or nearest active connection and cap or plug.

D. When vent stack(s) thru roof(s) are abandoned leave existing vent stack thru roof in place, cut pipe and cap as close as possible to underside of roof deck.

E. Coordinate all system shut down with Owner. Request shut down minimum 72 hours prior to scheduled shut down period. Do no shut down any system without approval of Owner. Perform shut down at premium time if required.

F. Refer to Architectural Demolition Plans for fixtures to be removed.

3.08 CONNECTIONS TO EXISTING SYSTEMS:

A. Make connections to existing systems only at time authorized, in writing, by Owner.

B. Do not take system out of service during occupied working, office or school hours.

C. Drain existing systems and fill, vent, test, balance and put existing systems into operation after connections have been made.

D. Repair existing insulation at points of connection to existing work.

3.09 PAINTING:

A. Refinish equipment damaged during construction to new condition.

B. Paint all non-potable water pipe and insulation with two (2) coats of bright yellow paint in compliance with the Local Plumbing Code and these specifications. Paint piping prior to installing insulation. Paint type to be equal to Paint Specified in Painting Section of the Specifications.

C. Other painting is specified in "PAINTING SECTION, Finishes Division".

3.10 PIPE IDENTIFICATIONS:

A. Identify all piping exposed to view or accessible through removable ceilings or access panels with plastic snap-on pipe line markers. Color code markers in accordance with ANSI A13.1. Show pipe contents and direction of flow. Markers on lines 8" OD and smaller shall be taped in place; on lines over 8" OD secure with spring clips.

B. Submit samples of all nameplates, tags, chains and etc., for approval.

C. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.

D. Label Spacing and Extent:

1. On straight run of pipes; Above suspended ceilings space labels approximately 10 feet on center; elsewhere, 20 feet on center.

2. Wherever a pipe enters or leaves a room or building.

3. At change of direction.

4. At main valves and control valves (not equipment valves).

5. On risers, just above and below floors.

3.11 VALVE TAGS:

A. 2" X 3" laminated plastic with 1/2" numbers engraved at top, leaving space for further engraving by others. Secure tags with chains to valve yoke or stem, not handles.

B. Valve tags colors:

1. Plumbing: Red tags with white numbers.

C. Valve tag locations: At all valves on mains, risers and branches.

D. Valve tag numbers: Starting with Number 1, number tags in sequence from the lowest point to the highest point in the building. In existing building extend existing sequences.

E. Starting with Number 1, number valve tags on this floor extending existing sequence. If there are no valve tags on existing valve, provide tags for all existing valves and new valves beginning floor sequence with Number 1.

3.12 VALVE CHARTS:

A. In all mechanical rooms, provide charts showing number and locations of all valves, type of service, etc. Frame with aluminum, under glass.

B. In existing buildings include existing valves in the charts of new valves.

3.13 WARRANTY AND INSTRUCTIONS:

A. See General Conditions - One-Year Warranty.

B. Contractor shall and hereby does warrant all materials, workmanship and equipment furnished and installed by him to be free from defects for a period of one (1) year after date of substantial completion of the Contract. Should any defects in materials, workmanship, or equipment be made know to Contractor within the one (1) year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.

C. After completion of the work, Contractor shall operate the equipment which he installs for a period of ten (10) working days, as a test of satisfactory operating conditions. During this time, Contractor shall instruct the Owner's operating personnel in the correct operation of the equipment. Furnish necessary oral and written operating instructions to the Owner's representative.

D. Provide three (3) sets of manufacturer's operating and maintenance manuals and parts lists including nearest manufacturer's sales and service representative by name, address and phone for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency there of. Include all warranty dates on equipment and guarantees. Include names, address and phone of any subcontractor and work performed. Bind above items in loose leaf three (3) ring binders with tab for each class of equipment.

E. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.

F. Make available to the Owner, without additional cost, service and adjustment of the equipment for the guarantee period.

3.14 PROJECT CLOSE-OUT DOCUMENTS:

A. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:

1. Record drawings – Plumbing & Fire Protection (reproducible). Electronic drawings dwg format and pdf format.

2. Equipment and Fixture Submittal Data: List of manufacturers representative including name, address and telephone number that supplied requirement (3).

3. Equipment operating and maintenance manuals including: Spare parts required (3).

4. Maintenance schedule (3).

5. Equipment warranty dates and guarantees (3).

6. List of Owner's Personnel who have received maintenance instructions.

7. Record of inspections indicating what system was tested, type of tests, date of tests and those parties witnessing tests.

8. Valve Tag Chart.

9. Current flow test.

1.00 GENERAL:

1.01 SCOPE:

A. Provisions of this section apply to all Plumbing work.

B. Include Section 15410, "GENERAL PROVISIONS - PLUMBING AND FIRE PROTECTION", with this Section.

C. All tests shall be witnessed by the Architect in addition to authorities having jurisdiction. A minimum of 48 hour notice is required prior to performance of test.

2.00 PRODUCTS:

2.01 NOT APPLICABLE

3.00 EXECUTION:

3.01 GENERAL REQUIREMENTS:

A. After system have been installed, Test, Balance and Adjust System for proper operation, flow rates, pressures and temperatures. Correct any noise and/or vibration conditions.

B. Perform all tests as required by local codes. Contractor shall furnish testing equipment. Keep a record of all tests indicating dates of tests, those persons witnessing tests and results of tests.

C. Provide with the Close-Out Documents a Testing Record.

D. If local Codes are more stringent, local Codes shall govern.

3.02 SANITARY WASTE SYSTEMS:

A. Test piping by stopping lower outlets and filling with water to 10' hydrostatic head. Stop leaks and repeat test until watertight. All joints shall be exposed throughout test.

B. Provide "Ball Test" on all piping 3" and larger with ball 1/2" smaller than pipe diameter.

C. Provide visual inspection of all building drain piping below grade. Visual inspection shall be by means of a video camera routed through the drain system. Where the drain piping is connected to existing drain piping, the visual inspection shall include the existing drain piping from the point of connection, downstream to the point of connection to the public utility. A video tape and written report, noting any defects, on the findings of the visual inspection shall be provided to the owner with the close-out documents. The Plumbing Contractor shall provide personnel and equipment required for the visual inspection.

3.03 DOMESTIC WATER PIPING:

A. On completion of roughing-in, cap all outlets, make connections with house supply line, and put under full water pressure. Test by applying additional pressure (by temporary pump or compressed air connection) to total hydrostatic pressure 1-1/2 times street pressure but not less than 150 psig for not less than 4 hours.

B. Immediately and completely stop all leaks and retest until system is watertight. After testing, leave general pressure on until ready to install fixture (except when necessary to drain to avoid freezing during construction). After completion of all tests, repairs and installation of fixtures, flush all domestic hot and cold water piping with water to remove all sediment scale and until water runs clear, then disinfect.

C. Disinfect piping with hypochlorite solution of chlorine or compressed chlorine gas applied through on approved chlorinator. Operate all valves and faucets several times to insure the chlorine reaches all parts of the system. Feed water and chlorination agent into the system at rates that will provide a residual chlorine content of not less than 50 ppm after a retention period of 6 hours and 10 ppm after a retention period of 24 hours. Upon completion of treatment, flush treated water from each system until the water supply is satisfactory to the public health authority having jurisdiction. Provide Architect a certificate of compliance from the local Health Department.

D. Clean air aerators, hose sprays, flush valves, etc. and adjust to proper flow rates.

3.04 NATURAL GAS PIPING TESTS:

A. After all piping is roughed-in but before connection to main or to appliances or equipment, test piping for tightness as required by local gas company. In the absence of such requirements, apply in Architect's presence an air pressure test equal to 25 psig. Piping shall maintain pressure without drop for at least four (4) hours. Stop all leaks shown up by such test and repeat test until piping is air tight.

3.05 FIRE PROTECTION PIPING TEST:

A. Test in accordance with NFPA Pamphlets 13 and 20. Architects, Owner's, Underwriters and local Fire Marshall shall witness test. Provide certificate of inspection to the Architect/Engineer including the name of those witnessing the test.

B. On completion of roughing-in and before connection to existing piping, cap all outlets, make connections with house supply line, and put under full water pressure. Test by applying additional pressure, by temporary pump or compressed air connection, to total hydrostatic pressure 1 1/2 times street pressure, but not less than 200 psig for a period of not less than four (4) hours. Immediately and completely stop all leaks. Retest when system is watertight.

C. After testing, leave general pressure on until ready to install sprinkler heads and fire department valves, etc. except when necessary to drain to avoid freezing during construction.

3.06 COMPLETION OF TEST:

A. Upon completion of all testing, Contractor shall provide to the Architect copies of test results and include a listing of all personnel witness to the tests.

1.00 GENERAL:

1.01 SCOPE:

A. Include Section 15410, "GENERAL PROVISIONS – PLUMBING AND FIRE PROTECTION", with this Section.

2.00 PRODUCTS:

2.01 MATERIALS:

A. Pipe and fittings to be the same manufacturer.

2.02 SANITARY - WASTE AND VENT PIPING:

A. Piping shall be PVC plastic piping, except in plenum return areas.

B. PVC plastic pipe: PVC-DWV, ASTM D-2665.

C. Cast iron soil pipe: Cast iron non-hub pipe and fittings. CISPI Standard 301 shall be installed in all plenum areas.

D. Joints for hubless cast iron pipe and fittings: Hubless pipe and fittings shall be joined by a heavy-duty coupling. Approved manufacturers: Husky SD 4000, Clamp All 125 or MG Couplings.

E. Joints for PVC plastic pipe: Solvent welded, ASTM B-2564.

F. Install vent stacks through roof. Terminate 12" above finish roof. Flashing is specified under Roofing Section.

D. Connect to site sanitary 5'-0" from Building. Verify with Civil Site Drawings exact size, location and invert of site sewer prior to beginning work.

2.03 DOMESTIC WATER PIPING:

A. Domestic Water Piping: Copper tube.

B. Copper Tube: ASTM C-88, copper water tube, Type "L" hard temper inside building, Type "K" outside building and below slab on grade. Fittings, cast brass or wrought copper water tube fittings, ANSI B-16.18 or B-16.22.

C. Joints on copper tube:

1. Inside Building: Properly cleaned fluxed and soldered as recommended by manufacturer, using 95-5 solder and 100% lead free flux.

2. Outside Building and below slab on grade: "Sil-Fos".

D. Provide temporary construction water at site as required.

E. Connect to water service 5'-0" from building, provided and installed under Civil Section. Verify exact location with Civil Drawings.

F. All water piping installed below slab on grade to be type "K" soft copper bent up on both ends with no joints below slab.

2.06 NATURAL GAS PIPING:

A. All gas piping: Black steel. All gas piping below grade, mill-wrapped with fittings field-wrapped with PVC tape, same thickness as millwrapping. Mill wrapping shall be X-TRU coat.

B. Black steel pipe, Schedule 40, ASTM A-53. Fittings on pipe 2" and smaller, black malleable iron screwed fittings, ASTM A-197. Fittings on pipe 2-1/2" and larger, welded, using butt welding fittings.

C. Joints on screwed pipe made up with Teflon tape applied to male threads only.

D. Joints on welded pipe made up with butt welding fittings. Mitering and notching for tees, etc., not permitted. Weldolets are permitted.

E. Unions 2" and smaller, black malleable iron screwed, unions 2-1/2" and larger flanged.

F. Arrange for tapping of utilities main, service from main to meter and installation as required by local utility. Pay all charges, fees, temporary deposits, etc.

G. All gas piping in the 2 psig system, labeled at the beginning, at all gas cocks, at ends and at 4' intervals with labels reading "2 psig". See piping identification for materials.

H. Install appliance type regulators as shown on drawings. Regulators shall have vent limiting device as required by local code and local utility, or shall be vented to the exterior as approved by Architect.

I. Sleeved gas piping below slab shall be type "K" copper tubing, ASTM B88, with lead free soldered fittings.

J. All exposed exterior piping shall be painted with two coats of paint equal to “Tar-Guard” by Sherwin Williams. Coordinate colors with architect.

2.07 VALVES:

A. Domestic Water Piping Valves:

1. Ball Valves: All bronze, 150 psig WP, chrome plated bar stock ball, full port Teflon seats, stem packing seal and thrust washer, Watts B-6080 or B-6081, Apollo 20-100, Red White 5044F or 5094F, Kitz 56 or 57. Provide valve handle extension to (minimum 1") clear insulation.

2. Check valves 2" and smaller: All bronze, 125 psig WP, bronze disc, swing check, Stockham B-309, Crane 1342, Nibco S-413-B, Milwaukee 1509, Red White 237, Kitz 14.

3. Check valves 2-1/2" and larger: Iron body, bronze trim, switch check, 125 psig WP, Stockham G-931, Crane 373, Nibco F-918-B, Milwaukee F2974, Red White 435, Kitz 78.

B. Water pressure reducing valves: Watts, Wilkins, or Cash Acme, complete with inlet strainer, unions, inlet and outlet pressure gages and shut-off valve up stream of strainer.

C. Natural gas valves: Plug cocks 2-1/2" and larger, Rockwell 143; 2" and smaller, Rockwell 142, A.F.C. or Walworth, lubricated, 175 psi.

D. Gas pressure regulator:

1. System Regulator: Equal to Reliance Model 1893 with built-in under and over pressure shut off size and capacity as shown on drawings.

2. Appliance Regulator: Equal to Maxitrol 325-5 on 325-5M complete with vent limiting device. Valve shall be full line size and capacity as shown on Drawings. Regulator to meet ANSI

Z21.80 requirements.

2.08 PIPE HANGERS:

A. General: Pipe hangers, Grinnell, PHD, Michigan Hanger, or Elcen. Grinnell figure numbers are given for reference. Provide copper clad hangers on bare copper lines.

B. Pipe hangers for lines 3" and smaller, adjustable wrought ring hangers, Grinnell Fig. 97 or wrought clevis hangers, Grinnell Fig. 260.

C. Pipe hangers for lines 4" and larger, adjustable wrought clevis hangers, Grinnell Fig. 260.

D. Parallel piping graded in same direction may be grouped on trapezes. Trapezes for line 4" and smaller, Unistrut P2000 channel, or equal, with rods sized as specified below for largest pipe on trapeze. Guide lines on (but not anchor to) trapezes using Unistrut Series P1100 clamps. Trapezes shall not exceed 3' in length. Space lines to allow at least 3" clear between adjacent pipe or pipe covering and between pipes or pipe covering and rods. Space trapezes as specified for pipe hangers based upon smallest size of pipe on trapeze.

E. Provide riser clamps on pipe risers on each floor. Clamps in contact with copper or plastic pipe, plastic coated.

F. Beam Clamps: Grinnell Fig. 229.

G. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts. Grinnell Fig. 282.

H. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (power driven anchors are not acceptable).

I. Size rods for pipe hangers not smaller than the following: 3/8" rods for pipe up to 2", 1/2" for 2-1/2" and 3" pipe, 5/8" rods for 4" and 5" pipe, 3/4" rods for 6" pipe, and 7/8" rods for 8" and 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.

J. Space pipe hangers at maximum: 5' intervals for cast iron pipe with additional hanger at each fittings. Pipe hanger spacing for screwed, solder joint and welded piping: 1/2", 6 ft.; 3/4" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3", 12 ft.; 4" to 6", 14 ft.; 8" and over, 16 ft. Polypropylene and PVC plastic pipe 4 ft. horizontally maximum or as directed by manufacturer if closer, and 10 ft. vertically. Install additional hangers at change of direction and valve clusters.

K. Install pipe hangers on insulated pipe over pipe covering. Provide sheet metal saddle under hanger length to be 1-1/2 times the pipe diameter, minimum 12" long.

L. On sanitary and storm piping requiring insulation, hanger may be installed directly on pipe and insulation installed over hanger.

3.00 EXECUTION:

3.01 PIPE INSTALLATION:

A. All piping shall be securely anchored in place to the Building Structure.

B. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.

C. Provide welding material and labor in accordance with the welding procedures of the Heating, Piping, and Air Conditioning Contractor's National Association or other approved procedure conforming to the requirements of ANSI B-31.9 "Building Service Piping". Employ only welders fully qualified in the above specified procedure and currently certified by recognized testing authority. Use either electric arc or oxactylene welding. Provide full perimeter wells at both face end and collar end of each slip-on flange.

D. Install piping to allow for expansion. Make connections to all equipment to eliminate undue strains in piping and equipment. Furnish necessary fittings and bends to avoid spring of pipes during assembly.

E. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.

F. Make pipe size reductions using reducing fittings. Bushings are prohibited.

G. Install 3/4" ball or gate valve drains with hose adapters at low points of water piping and at bases of all risers or where shown provide large drains.

H. Make connections to equipment using screwed unions in sizes 2" and smaller and flanged unions in sizes 2-1/2" and larger. Install unions in all piping connections to each piece of equipment.

I. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulation unions or couplings, equal to EPCO.

J. Run piping concealed, except where specifically shown or specified exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise.

K. Lay underground pressure piping so top of pipe is at least 18" below finished grade. Provide deeper bury if required by local regulations. Support all underground piping solidly along body of pipe. Strongly suspend other piping from building construction.

L. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two (2) wrappings of polyvinyl chloride tape or equivalent protection approved by Architect.

M. Install shock arrestors as manufactured by J. R. Smith, Josam, Zurn or Wade as required by the IPC Plumbing Code and where indicated on drawings. Size in accordance with manufacturer requirements.

3.02 INSTALLATION OF VALVES:

A. Provide shut-off valves where shown and detailed on Drawings. Locate valves to isolate each item to facilitate maintenance and/or removal.

B. Locate valves in piping connections to water heaters, etc., so heads and tube bundles can be removed without disconnecting equipment or piping other than union or flange connections immediately adjacent to heat exchangers.

C. Provide sweat to screw adapters where required.

D. In Buildings with water pressure exceeding 80 psig, provide and install a water pressure reducing valve(s) immediately upon entering building or as shown on Drawings. The P.R.V. shall be line size and have an integral strainer or separate WYE strainer up stream of P.R.V. Provide a ball or gate valve immediately upstream of P.R.V. and strainer.

SECTION 15451 - GENERAL FIRE PROTECTION REQUIREMENTS

1.00 GENERAL:

1.01 RELATED DOCUMENTS

A. Division 1 – Section “ALTERNATES”: Coordinate related Division 15 work and modify surrounding work to integrate the Work of each Alternate.

1.02 SUMMARY

A. Description of General Fire Protection Requirements. Applies to all Division 15, Section 15450’s (Fire Protection).

1.03 DEFINITIONS

A. "Provide" means to furnish and install, complete and ready for operation.

1.04 REFERENCES

A. ASME: American Society for Mechanical Engineers.

B. ASTM: American Society of Testing and Materials.

C. AWWA: American Water Work Association.

D. FM: Factory Mutual.

E. NEMA: National Electrical Manufacturer’s Association.

F. NFPA: National Fire Protection Association.

G. MSS: Manufacturer’s Standardization Society of the Valve and Fitting Industry.

H. UL: Underwriters Laboratories, Inc.

1.05 REGULATORY REQUIREMENTS

A. Comply with current edition, unless otherwise noted, of the following codes and standards.
   1. ANSI B31.9 - Building Services Piping.
   2. ADA - American’s with Disabilities Act.
   3. NFPA 13 – Installation of Sprinkler System.
   4. NFPA 24 – Installation of Private Fire Service Mains.
   5. NFPA 30 – Flammable and Combustible Liquids Code.
   6. NFPA 31 – Installation of Oil-Burning Equipment.
   7. NFPA 45 – Fire Protection for Laboratories Code.
   8. NFPA 54 – National Fuel Gas Code.
   9. NFPA 70 - National Electrical Code.
   10. NFPA 101 - Life Safety Code.
   11. IBC - International Building Code with Fire, Mechanical, Plumbing and Gas Codes.

B. Permits, Licenses, Inspections and Fees.

1. Obtain and pay for all permits, licenses, inspections and fees, and comply with all rules, laws and ordinances pertaining to the Contractor's portion of the Work.
2. Obtain and pay for certificates of required inspections, and file certificates with Owner.

1.06 PRODUCT REQUIREMENTS

A. Provide new standard, materials throughout.

B. Multiple items of similar equipment shall be the product of the same manufacturer.

C. Substitutions:
1. Comply with the provisions of Division 1, Section "Product Requirements" and the following:
2. When several manufacturers are named in the specifications, the corresponding products and models made by the specified manufacturers will be accepted and Contractor may base his bid on any one of those products. However, if the Contractor's bid is based on products other than the scheduled or specified **basis of design**, it shall be understood that there will be no extra cost involved whatsoever, and the effect on other trades has been included in the Contractor's proposal. Coordination with other trades for substituted equipment or use of products other than the named basis of design shall be the responsibility of the Contractor furnishing the equipment.
3. The basis of design manufacturer's equipment has been used to determine space requirements. Should another approved manufacturer's equipment be used in preparing proposals, Contractor shall be responsible for determining that said equipment will fit space allocated. Submission of shop drawings or product data on such equipment shall be considered as indicating that the Contractor has reviewed the space requirements and the submitted equipment will fit the space allocated with due consideration given to access required for maintenance and code purposes.
4. The basis of design manufacturer's equipment and scheduled Fire Protection equipment electrical requirements have been used to coordinate the electrical requirements of the plumbing equipment with the electrical systems serving that equipment.
   a. Contractor shall coordinate the electrical requirements of the equipment actually furnished on this project and provide the electrical systems required by that equipment at no additional cost to the Owner.
   b. Equipment of higher or lower electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no additional cost to the Owner.
   c. Prior to approval of submittals of Fire Protection equipment with electrical requirements that are greater or lower than those shown on the Drawings, Contractor shall submit letter verifying that required changes to the electrical system, serving the specific piece of equipment in question, have been coordinated with the electrical contractor. Letter to be included with the associated equipment submittal, addressed to the Architect with a copy to the electrical engineer.
5. Each bidder may submit to the Architect a list of any substitutes which he proposes to use in lieu of the equipment or material named in the specifications with a request for the approval of proposed substitutes. To be considered, such requests must be delivered to the office of the Architect not later than 10 days prior to bid due date. The submittal shall include the following:
   a. Specific equipment or material proposed for substitution giving manufacturer, catalog and model number.

b. All performance and dimensional data necessary for comparison of the proposed substitute with the equipment or material specified.
c. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute may require.

6. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution is final.

1.07 SUBMITTALS

A. Submit under provisions of Division 1, Section "Submittal Procedures" and the following:

B. Product Data: Submit to the Architect and obtain his approval of a complete list of materials and equipment which are to be provided under the 15450 Sections of Division 15.
1. List shall be complete with manufacturer's names, catalog number, dimensions, specifications, rating data and options utilized. Capacities shall be in the terms specified.
2. Call attention to deviations from specified items as to operation and physical dimensions.
3. Performance curves for pumps shall be included.
4. Final equipment orders shall not be placed until submittals have been returned marked "No Exceptions Noted" or "Make Corrections Noted".
5. Bind all equipment submittals and provide index tab for each type of equipment. Submit all at one time. Reserve two sets for project close-out documents.

C. Shop Drawings: Before starting work, submit and obtain approval from Architect of detailed drawings of the following, fully dimensioned and drawn to 1/8" to 1'-0" scale. Submit six (6) prints of each drawing. Engineer will return five (5) of the prints with comments noted. Failure to submit shop drawings will make the Contractor responsible for changes required to facilitate installation.
1. Fire Protection Systems. See Division 15, Section "Fire Protection System."
2. For multi-story buildings, submit detailed floor penetration sleeve layout drawings. See Division 15, Section "Plumbing Basic Materials and Methods," Article "Informational Submittals."

1.08 COORDINATION DRAWINGS

A. General:
1. Within 60 days of Notice to Proceed provide Coordination Drawings for the following areas of the building:
a. Auditorium (Include all Rigging)
2. Do not base Coordination Drawings on reproduction of Contract Documents or standard printed data.
3. Submitted Coordination Drawings are for information only and typically will not be returned to the Contractor. Architect will not take any action, but may define coordination conflicts or problems and inform the Contractor of such conflicts or problems.

B. Content:
1. Project specific information, drawn accurately to scale.
2. Show sequencing and spatial relationship of separate units of work that must function in a restricted manner to fit in the space provided, or function as indicated.
3. Indicate dimensions shown on Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum

clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

C. Format:
1. Coordination shop drawings shall be drawn to a scale of not smaller than ¼" = 1'-0".
2. Provide drawings on electronic media in AutoCad .dwg format.
3. Provide layering system separate from wall outline and unique to each discipline.
4. In addition to plan view, provide sections as required to clarify congested situations and verify vertical clearances.
5. Base drawings and building sections in .dwg format will be provided by Architect.

D. Fire Protection Shop Drawings: Fire Protection subcontractor shall add all fire protection equipment, piping, sprinkler heads and other elements to database.
1. Upon completion of Fire Protection shop drawings, transmit electronic database to Electrical subcontractor.

E. General Contractor's Final Coordination: General Contractor shall thoroughly review shop drawings, adding additional building elements where appropriate, and shall resolve conflicts, coordinating with the Architect, and the various subcontractors.

F. Submit Coordination Shop Drawings: Upon completion of final coordination, General Contractor shall approve coordination shop drawings and transmit 3 sets of hard copies and electronic files on CD's to Architect.

G. The Architect will not process fire protection shop drawings until such time as the coordination drawings have been sufficiently completed and conflicts resolved.

1.09 QUALITY ASSURANCE

A. Installer's Qualifications: Firm experienced in installation of systems similar in size and complexity to those required for this project, plus the following:
1. Acceptable to, or licensed by, manufacturer.
2. Not less than 3 years experience with systems.
3. Successfully completed not less than 5 comparable scale projects using systems similar to those for this project.
4. Professional Engineer licensed in the State in which the work occurs; or NICET Level 3 and licensed by the State Fire Marshall in the State in which the work occurs. NICET Level 3 designer must be an employee of the Fire Protection Contractor. NICET Level 3 designer must oversee installation of shop drawings.

1.10 SUMMARY OF WORK

A. Scope: Provide all labor, materials, equipment and services necessary for the completion of all fire protection work shown or specified, except work specified to be done or furnished by others, complete and ready for operation.

1.11 DRAWING INTERPRETATION AND COORDINATION

A. Drawings are intended to show size, capacity, approximate location, direction and general relationship of one phase to another, but not exact detail or arrangement.

B. Do not scale drawings for location of system components. Check all measurements, location of pipe, ducts, and equipment with the detail architectural, structural, and electrical drawings and conditions existing in the field and lay out work so as to fit in with

ceiling grids, lighting and other parts.

C. Make minor adjustments in the field as required to provide the optimum result to facilitate ease of service, efficient operation and best appearance.

D. Where doubt arises as to the meaning of the Drawings and Specifications, obtain the Architect's written decision before proceeding with parts affected; otherwise assume liability for damage to other work and for making necessary corrections to work in question.

E. Refer to Architectural Drawings for all dimensions and location of lights, ceiling diffusers and sprinkler heads.

1.12 PROJECT/SITE CONDITIONS

A. Visiting Site: Visit site and become familiar with location and various conditions affecting work. No additional allowance will be granted because of lack of knowledge of such conditions.

B. Determine sizes and locations, and inverts of existing and new utilities near site.

C. Cause as little interference or interruption of existing utilities and services as possible. Schedule work which will cause interference or interruption in advance with Owner, authorities having jurisdiction, and all affected trades.

1.13 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit under provisions of Division 1 Sections - "Closeout Procedures" and "Project Record Documents" and the following.

B. Record Drawings:
1. Keep accurate record of corrections, variations, and deviations, including those required by change orders to the Fire Protection drawings.
2. Accurately show location, size and elevation of new exterior work dimensioned from permanent structure.
3. Record changes daily on a set of prints kept at the job site.
4. Submit prints marked as noted above to Architect for review prior to request for final payment.
5. Marked prints will be returned to Contractor for use in preparing Record Drawings.
6. The Fire Protection Contractor shall use marked up drawing showing as-built conditions provided by Contractor to prepare Record Drawings. Asbuilt drawings shall be incorporated on electronic files.

C. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:
1. Record drawings – fire protection piping/shop drawings, bond and electronic files in AutoCAD *.dwg & PDF format.
2. Equipment Submittal Data (2).
3. Equipment operating and maintenance manuals (2).
4. Equipment warranty dates and guarantees (2).
5. List of Owner's Personnel who have received operating and maintenance instructions.
6. Install valve charts and valve location plans in main mechanical room. (See Division 15, Section "Plumbing Identification.")

7. Submit factory start-up/field reports for:
   a. Pressure Reducing Valve

D. Contractor's Material and Test Certificate for above ground piping.

E. Contractor's Material and Test Certificate for underground piping.

END OF SECTION 15451

SECTION 15453 - BASIC FIRE PROTECTION MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Description of common piping, equipment, materials and installation for Fire Protection systems.

B. This Section includes the following:
1. Piping materials and installation instructions common to most Fire Protection piping systems.
2. Sleeves.
3. Concrete.
4. Grout.
5. Escutcheons.
6. Access doors - Building.
7. Flashing
8. Workmanship.
9. Cutting and patching.
10. Excavation, trenching and backfilling.
11. Piping systems installation - Common Requirements.
12. Equipment installation - Common Requirements.
13. Painting and finishing.
14. Concrete bases.
15. Supports and anchorages.
16. Protection and cleaning of equipment and materials.

1.02 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.03 SUBMITTALS

A. Product Data: For the following:
1. Transition fittings.
2. Escutcheons.
3. Access doors - building.

1.04 INFORMATIONAL SUBMITTALS

A. Shop Drawings: For multi-story buildings, submit detailed drawings of the floor penetration sleeve sizes and locations, including the following information:
   1. Fully dimensioned off column lines with location respective to adjacent walls shown.
   2. Sleeve size.
   3. Pipe size.
   4. Pipe service.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture. If pipes do not ship with end caps, cover ends of pipe stored on site with 6 mil plastic.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.06 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for Plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves and inserts in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate installation of building access doors for fire protection items requiring access that are concealed behind finished surfaces.

D. Electrical Characteristics for Fire Protection Equipment:
   1. Coordinate electrical system installation to match requirements of equipment actually furnished on this project.
   2. Include a letter with the respective equipment submittal from the electrical contractor and approved by electrical design consultant, detailing changes to the electrical system required to accommodate changes in the power distribution system to accommodate Fire Protection equipment that has different electrical power requirements from that equipment used as basis of design, or power provisions, as shown on the electrical drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:

2.02 PIPE, TUBE AND FITTINGS

A. Refer to individual Division 15 Fire Protection Piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

C. All piping and fittings prior to PRV shall be rated for 250psi.

2.03 JOINING MATERIALS

A. Refer to individual Division 15 Fire Protection Piping Sections for special joining materials not listed below.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

2.04 SLEEVES

A. Galvanized-Steel Sheet: 20 gauge minimum thickness; round tube closed with longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Firestopping Sealant: See Division 7 Sections “Through-Penetration Firestop Systems” and “Fire Resistive Joint Systems” for firestopping sealant requirements.

D. Stuffing Insulation: Glass fiber type, non-combustible.

2.05 CONCRETE

A. Nominal weight concrete (145 PCF) using Type I Portland Cement, 1-inch maximum size coarse aggregate to provide a minimum 28 day compressive strength of 3000 psi.

2.06 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

2.07 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
   1. Finish: Polished chrome-plated.

2.08 ACCESS DOORS – BUILDING

A. Manufacturers:
   1. Bilco.
   2. Milcor.
   3. Nystrom.

B. Construction:
   1. Door: 14-gauge, cold rolled steel.
   2. Frame: 16-gauge, cold rolled steel of configuration to suit material application.
   3. Hinge: Concealed spring hinge.
   4. Latch: Screwdriver cam latch.
   5. Finish: Phosphate dipped and prime coated.
   6. UL labeled when in fire-rated construction with rating to match construction.
   7. Stainless steel (Type 304) shall be used in ceramic tile or glazed structural tile.

C. Size: 18 inch x 18 inch minimum, as indicated on drawings, or as required to allow inspection, service, and removal of concealed items.

2.09 FLASHING

A. Flexible Flashing: 47 mil thick sheet butyl compatible with roofing.

B. Lead Flashing: Waterproofing, 5 lb/SF sheet lead.

C. Pitch Cups: 20 gauge galvanized steel, minimum 8 inches deep, bases mitered and soldered and extending at least 4 inches horizontally.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. First class and in accordance with best practice. Work to be orderly, neat, workman-like in appearance and performed by skilled craftsman.

B. Poor or improper workmanship shall be removed and replaced as directed by the Architect without additional cost to the Owner or design professionals.

3.02 CUTTING AND PATCHING

A. Comply with the requirements of other Divisions for the cutting and patching required to accommodate the installation of Fire Protection work. Repair and finish to match surrounding.

B. Architect’s approval required before cutting any part where strength, or appearance of finished work is involved.

C. Openings are to be laid out and built-in, set sleeves and inserts and furnish detailed layout drawings to other trades in advance of their work.

D. Core drill or saw cut openings in existing masonry construction.

3.03 EXCAVATION, TRENCHING AND BACKFILLING

A. Provide trenching, excavation, backfilling necessary for performance of work, including excavation of rock and all other materials which may be encountered.

B. Grade bottom of trenches evenly and excavate bell holes to insure uniform bearing for the full pipe length. Excavate minimum 6 inches below pipe. Refill cuts below grade with sand.

C. Backfill after inspection by Architect and authorities having jurisdiction. Backfill compacted areas (engineered fill) with sand or fine gravel in accordance with requirements in Division 2. Section "Earthwork" no less than 95% compactancy. Backfill paved areas with sand or fine gravel compacted to meet requirements of Paving Section. Backfill shall be free of rock, wood, steel, brick, etc. Do not disturb pipe.

D. Refer to Division 15, Fire Protection Piping Sections for specific bedding and backfill requirements.

E. Restore existing pavement, curbs, sidewalks, sodding, bushes, etc., matching surroundings.

F. Restore all pavement cuts to meet the requirements of the cuts of the local authority.

3.04 PIPING SYSTEMS INSTALLATION - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Fire Protection Piping Sections specifying piping systems.

B. Drawings, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas and stairwells.

D. Install piping indicated to be exposed and in service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections. No mitering or notching for fittings permitted.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install escutcheons where exposed piping penetrates walls, ceilings, and floors in finished spaces.

3.05 SLEEVES

A. Sleeves are not required for core-drilled holes.
   1. In mechanical room floors and other potentially wet areas, provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

B. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
   1. Cut sleeves to length so that sleeve extends out ½ inch from both surfaces.
      a. Exception: Extend sleeves installed in floors of mechanical equipment areas, or other potentially wet areas, 1-1/2 inches above finished floor level. Caulk space outside of sleeves water tight.
   2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
   3. Use the following sleeve materials:

a. Sleeves for Piping Through Concrete Beams, Concrete Walls, Footings, and Potentially Wet Floors: Steel pipe.
b. Sleeves for Piping through Masonry Walls and Gypsum Board Partitions: Steel sheet sleeves 1/2 inch larger than pipe or pipe covering.

4. Where piping penetrates non-rated equipment room wall, floors or roofs outside of a shaft, close off space between pipe or duct and adjacent work with stuffing insulation and caulk air tight.
5. Above ground, non-rated, exterior wall penetrations: Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
6. Provide for continuous insulation wrapping thru sleeve.
7. Seal space around the outside of sleeves with grout at masonry walls and floors and dry wall mud at gypsum board partitions.

C. Fire-Rated Penetrations: Where pipes pass through fire-rated and fire-resistive floors, walls, and partitions, install appropriately rated sleeves and firestopping sealant. Firestopping materials and installation methods are specified in Division 7 Sections “Through Penetration Firestop Systems” and “Fire Resistive Joint Systems”.

3.06 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Fire Protection Piping Sections specifying piping systems.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

D. Flanged Joints:
1. 125 Pound Cast Iron Flange (Plain Face): Mating flange shall have raised face, if any, removed to avoid overstressing the cast iron flange.
2. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.07 PIPE CLEANING

A. Keep pipe clean and free of dirt. Keep caps on ends of pipe when it is stored on site and reinstall caps on ends of installed piping at the end of each day.

3.08 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.

D. Install equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with Contract Documents, obtain Architect's decision before proceeding.

E. Install equipment to allow right of way for piping installed at a required slope.

F. All equipment shall be firmly fastened in place:
   1. Pad mounted equipment shall be secured to pads using poured in place anchor bolts or cinch anchors.
   2. Vibration isolators shall be secured to floors or pads and equipment shall be bolted to the isolators.

3.09 PAINTING AND FINISHING

A. Except as specified below or noted on the Drawing, requirements for painting of Fire Protection systems, equipment, and components are specified in Division 9 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Painting of fire piping:
   1. The following piping within boiler and chiller room shall be painted in its entirety under Division 9: Painting. Color codes are listed here for information only.
      a. Fire Protection Piping: Red Metaltex B47R3.
   2. Should there be a conflict of colors in existing installations, contact the Architect.

3.10 CONCRETE BASES

A. Provide concrete foundations with nominal dimensions conforming to the following schedule for floor-mounted equipment:

Equipment	Foundation
Equipment and piping stands and supports	4" high pad
Equipment located in equipment rooms, not listed above	4" high pad or as indicated on the Drawings

B. Concrete bases shall be continuous and shall have beveled edges and smooth float finish. Concrete bases shall be reinforced with No. 3 bars a maximum of 12" on center each way, and held in place with dowel rods at each corner anchored in the slab. Dowel rods shall not penetrate through the slab.

C. Roughen and clean exposed slabs before pouring foundations. Apply bonding agent to surfaces in contact.

D. Concrete pads shall extend a minimum of 4" beyond the equipment footprint in all directions, including appurtenances, vibration isolators, base elbow supports, and motors.

E. Equipment attached directly to foundations or inertia bases; bases provided with grout holes; and bases consisting of a structural frame shall have voids filled with grout after attachment to foundation.

F. Fill voids between baseplates and foundations, and level equipment, with grout.

3.11 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" requirements.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing and fire protection materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.12 GROUTING

A. Mix and install grout for Fire Protection equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.13 ACCESS DOORS – BUILDING

A. Provide access doors in wall and inaccessible ceilings to allow access to service and maintain concealed Plumbing equipment, valves, etc.

B. Coordinate installation of access doors with Divisions responsible for Building System in which panels are being installed.

3.14 PROTECTION AND CLEANING OF EQUIPMENT, FIXTURES, AND MATERIALS

A. Equipment and materials shall be carefully handled, properly stored, and protected from weather, dust-producing procedures, or damage during construction.

B. At completion of all work, thoroughly clean exposed materials (pipe, etc.) and equipment and make ready for painting.

END SECTION 15453

SECTION 15455 - FIRE PROTECTION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe, Fittings, Valves for:
   1. Service to new gymnasium addition.

B. System design and installation. Base system design hydraulic calculations using the area/density method on the following criteria and in accordance with NFPA 13 latest edition.
   1. Sprinkler Protection:
      a. Offices, classrooms, lobbies, waiting areas, educational areas, dining areas, and corridors: Light hazard, 0.10 gpm/sq. ft. over the hydraulically most remote 1500 sq. ft.
      b. Kitchen, Mechanical Equipment Rooms, Transformer Rooms, Electrical Switchgear Rooms, Electric Closets, Elevator Shafts, Elevator Machine Rooms, Refrigeration Service Rooms, and storage between 100 and 250 sq. ft.: Ordinary Hazard, Group 1, 0.15 gpm/sq. ft. over the hydraulically most remote 1500 sq. ft.
      c. Utility and Maintenance rooms, laundry, laboratory and storage rooms, storage rooms over 250 sq. ft., loading docks, energy centers areas: Ordinary Group 2, 0.20 gpm/sq. ft. over the hydraulically most remote 1500 sq. ft.
      d. Provide sprinklers in accessible shafts per NFPA 13 latest edition.
   2. Add water allowance of 250 gpm for inside and outside hose streams to the sprinkler requirements at the connection to the distribution main.
   3. Hydraulic Calculations: The calculated demand including hose stream requirements shall fall no less than 10 percent below the available supply curve.
   4. Comply with IBC (2009 Edition), NFPA 13 (2009 Edition), NFPA 30, Flammable and Combustible Liquid Code, NFPA 45, Standard on Fire Protection for Laboratory Using Chemicals, NFPA 54, National Fuel Gas Code, NFPA 58, Liquefied Petroleum Gas Code, NFPA 70, National Electric Code, NFPA 72, National Alarm and Signaling Code, and NFPA 101, Life Safety Code (2009 Edition).

1.02 RELATED SECTIONS

A. Section 15405 – Plumbing Identification.

B. Section 15451 – General Fire Protection Requirements.

C. Section 15453 – Basic Fire Protection Materials and Methods.

1.03 SYSTEM

A. A wet pipe sprinkler system providing coverage for new classroom addition and existing gymnasium existing building.

B. Fire service from approximately 5ft outside the building to inside the building.

1.04 SUBMITTALS FOR REVIEW

A. Submit under provisions of Division 1, Section “Submittal Procedures” and the following:

B. Product Data: Submit to the Architect and obtain his approval of a complete list of materials and equipment which are to be furnished under Division 15.
   1. List shall be complete with manufacturer’s names, catalog number, dimensions, specifications, rating data and options utilized. Capacities shall be in the terms specified.
   2. Call attention to deviations from specified items as to operation and physical dimensions.
   3. Performance curves for equipment such as pumps shall be included.
   4. Final equipment orders shall not be placed until submittals have been returned marked “No Exceptions Noted” or “Make Corrections Noted”.
   5. Bind all equipment submittals and provide index tab for each type of equipment. Submit all at one time. Reserve two sets for project close-out documents.

C. Shop Drawings:
   1. A reflected ceiling plan indicating locations of sprinkler heads, lights, HVAC devices, smoke detectors, exit lights and any additional items attached to ceiling. In lift out ceilings, sprinkler heads are to be centered in ceiling tiles. In hard ceilings, sprinkler heads to follow the general arrangement of the ceiling. After review by the Architect, revise layout as required.
   2. Prepare a working pipe shop drawing based on hydraulic calculations. The piping shop drawing shall indicate routing and configuration of piping, size of pipe, piping support, elevation of piping and coordination of piping with ductwork. Shop drawings shall include low point drain downs.
   3. Hydraulic calculations are to be prepared utilizing a current water flow test (maximum 90 days old). If current flow test is not available, obtain a current flow test and pay for all fees required.
   4. If water flow information is not available due to new main extension or other construction which prohibits the availability of flow information at the start of construction, the contractor shall estimate probable flow information based on information available. Once permanent water is available at the site, the Contractor shall perform a flow test, incorporate the information into the calculation and make any modifications to the system as may be required.
   5. When drawings and hydraulic calculations are submitted to the Engineer for review, they shall bear the seals of review and approval of the Architect, General Contractor, the Owners Insurance Underwriter, and the Nicet Level 3 Designer. The Nicet registered designer shall be an employee of the Fire Protection Installing Contractor and shall oversee installation of Project. Nicet registration seal shall be included on shop drawings.
   6. Contractor to provide to the State reviewing Agency a set of shop drawings reviewed and approved by Engineer of Record as required by the State of Alabama.
   7. The Contractor shall incorporate all comments for approval by local Fire Marshall’s Office and any State of Alabama Reviewing Agency. Contractor shall provide signed, and approved set of plans to Engineer upon approval by state and local authorities.
   8. Each system calculations, components and alarming to be on shop drawings.

1.05 SYSTEM INSTALLATION AND INSPECTION

A. Required Inspections:
   1. All underground and above ground fire line piping must be inspected by owner’s representative prior to being covered or concealed.

B. Fire Stopping:
   1. All fire stopping of any and all fire rated assemblies must be inspected and approved by a State Inspector prior to the work being concealed.

C. Hydrostatic Testing Requirements:
   1. The required hydrostatic testing of the underground and above ground fire line piping must be witnessed and approved by City Inspector prior to being covered or concealed.

D. Underground Fire Line Pipe Flush Test Requirements:
   1. The required flush test of the underground fire line piping must be witnessed by an Owners representative prior to being connected to the above ground piping or riser.

E. Acceptance Inspections & Testing:
   1. Allow fire protection and life safety systems installation and acceptance test must be inspected, test, witnessed and approved by an AHJ and Owner's representative.

F. Plans Review & Approval:
   1. All fire protection and life safety system drawings and specifications must be reviewed by this office to ensure code compliance prior to start of any work.

1.06 REGULATORY REQUIREMENTS

A. Materials: Conform to UL and FM Global Requirements and Standards.

B. Sprinkler System: Conform to NFPA 13, State of Alabama Fire Marshall Requirements, Hueytown Fire Requirements and Alabama State Building Commission Requirements.

C. NFPA 25, Inspections, Testing and Maintenance of Water-Based Fire Protection Systems.

D. NFPA 72, Standard for the Installation, Maintenance and Use of Protective Signaling Systems.

E. NFPA 72E, Standard on Automatic Fire Detectors.

F. Applicable Building Codes.

G. Welding Materials and Procedures: Conform to ASME Code.

H. Valves: Bear UL, FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

I. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.07 EXTRA MATERIALS

A. Provide extra sprinklers under provisions of NFPA 13, State, City, County, and Local requirements.

B. Provide suitable wrenches for each sprinkler type.

C. Provide metal storage cabinet in location designated. (Designate location).

PART 2 - PRODUCTS

2.01 PIPING BELOW GRADE AND BELOW SLAB ON GRADE

A. Ductile Iron: Cement lined ANSI A-21.50.

B. Joints on Ductile Iron: Standard mechanical joint ANSI A-21.11. Provide with retainer glands at all fittings and thrust blocks minimum 1 cubic yard of concrete at all changes of direction.

2.02 WET SPRINKLER SYSTEM

A. Wet System - Above Ground Piping:
   1. Black Steel Pipe:
      a. All piping 1-1/2” and smaller, all piping larger than 1-1/2” with cut grooves on threaded and all welded piping, Schedule 40 black steel ASTM A53, ASTM A795, ASTM A135.
      b. Piping larger than 1-1/2” for roll grooving only, Schedule 10 ASTM A795, ASTM B36.10. Schedule 10 pipe may not be used for threading or cut grooving. Schedule 7 pipe will note be accepted.
      c. Cast iron threaded fittings ANSI B16.4 cast iron flanges and flanged fittings ANSI B16.1.
      d. Malleable iron threaded fittings, ANSI B16.3.
      e. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, “C” shaped elastomeric sealing gasket, steel bolts, nuts and washers; galvanized for galvanized pipe.
      f. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement into pipe.
      g. Malleable Iron Fittings 175 lb. (250 lb.); ASME B16.3, threaded fittings.

      Black Steel Piping and fittings shall be domestic manufacturer. Bull Moose Tube, Victaulic, or Wheatland are approved manufacturers. Substitutions require prior approval.

      All piping and fittings prior to PRV shall be rated for 250psi.

   2. Copper Tubing: ASTM B75; ASTM B88; Type K, hard drawn.
      a. Fittings: ASME B16.22, wrought copper and bronze, solder joint, pressure type.
      b. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.

      Copper Piping and fittings shall be domestic manufacturer. Bull Moose Tube, ARGCO, Mueller, or Cerro are approved manufacturers. Substitutions require prior approval

B. Sprinklers:
   1. Sprinklers to be UL approved glass bulb quick response type.
   2. All sprinkler heads to be rated for 175°F, unless otherwise noted on drawings.
   3. Suspended Ceiling (Lay-in and Gypsum):
      a. Manufacturers:
         1) Viking Model M.
         2) Tyco, Reliable, Victaulic.
      b. Type: Quick response concealed pendant type with painted cover plate.
      c. Cover Plate: White. Unless indicated otherwise. Provide color chart to Architect for color selection.

d. Finish: Sprinkler Head – chrome plated.
e. Fusible Link: Glass bulb type temperature rated for specific area hazard.

4. Exposed Area Type:
   a. Manufacturers:
      1) Viking Model M.
      2) Tyco, Reliable, Victaulic.
   b. Type: Quick response upright type with guard.
   c. Finish: Brass or chrome plated.
   d. Fusible Link: Glass bulb type temperature rated for specific area hazard.
   e. Guards: Finish to match sprinkler finish.

5. Sidewall Type:
   a. Manufacturers:
      1) Viking Model M.
      2) Tyco, Reliable, Victaulic.
   b. Type: Quick response recessed sidewall type.
   c. Finish: Chrome plated.
   d. Escutcheon Plate Finish: Chrome plated in color.
   e. Fusible Link: Glass bulb type temperature rated for specific area hazard.

C. Pipe Hangers and Supports:
1. Conform to NFPA 13.
2. Hangers for Pipe Sizes ½ to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Plate Support: Carbon steel ring, adjustable, copper plated.
10. All hangers to be a maximum of 12 inches from the end of a branch line or an arm-over for drop.

Pipe hangers and supports shall be of one manufacturer. Grinnell, Anvil or Tolco are approved manufacturers. Substitutions require prior approval.

D. Gate Valves:
1. Up to and including 2 Inches:
   a. Manufactures:
      1) Nibco Model T-104-O.
      2) Where Nibco is listed, Victaulic, Stockham, Watts, Tyco and Milwaukee are equal.
   b. Bronze body, bronze trim 175 psi WP, UL Listed, rising stem, handwheel, solid wedge or disc, threaded ends.
2. Over 2 Inches:
   a. Manufactures:
      1) Nibco Model F-607-OTS.
      2) Where Nibco is listed, Victaulic, Watts, Tyco and Milwaukee are equal.
   b. Iron body, bronze trim 175 psi WP, UL Listed, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid bronze or cast iron wedge, flanged or grooved ends.

E. Butterfly Valves:

1. Cast or Ductile Iron Body
   a. Manufactures:
      1) Nibco Model GD-4765-4/8.
      2) Where Nibco is listed, Victaulic, Watts, Tyco and Milwaukee are equal.
2. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and internal tamper switch rated, UL / FM approved.

F. Check Valves:
1. Up to and including 2-1/2 inches to 6 inches:
   a. Manufacturers:
      1) Nibco Model G-917-W.
      2) Where Nibco is listed, Victaulic, Watts, Tyco and Milwaukee are equal.
   b. Iron body and swing disc, bronze seat, stainless steel spring, grooved ends, 175 psi WP.

G. Water Flow Switch:
1. System sensor WFD water flow detector. Poetter Reomer, Viking, and Tyco are acceptable manufacturers.

H. Supervisory Switches:
System sensor OSY2 Model tamper detector. Poetter Roemer, Viking, and Tyco are acceptable manufacturers.

I. Test and Drain Assembly:
1. Viking Model A-1 complete with sight glass and ½" orifice for test purpose. Pipe discharge to drain riser on to exterior and spill on splash block.

   Tyco, Victaulic, and Reliable are acceptable manufacturers.
2. The automatic control panel shall be factory assembled, wired and tested such that the only field wiring required shall be power in and motor circuit out.

2.03 FIRE STOP SYSTEMS

A. All wall and floor penetrations are to be closed. Refer to the Arch. Life Safety Plans and close all openings with a U.L. listed assembly compatible with the rating of the wall or floor being penetrated.

B. Non-rated walls – sheet rock joint compound may be used to seal opening.

C. For piping passing through listed sheet rock walls or partitions:
1. Uninsulated pipe passing through 2 hour walls or partitions – minimum 5/8" depth of Hilti FS 605 filling annular space between wall and pipe on both sides of wall. U.L. Listing #WL1056.
2. Uninsulated pipe passing through 2 hour walls or partitions – minimum 1-1/4" depth of Hilti FS 601 filling annular space between pipe and wall on both sides of wall, U.L. Listing #WL1054.

D. For piping passing through concrete floors, concrete walls or concrete block walls.
1. Uninsulated Schedule 40 steel pipe; fill annular space between pipe and opening with Hilti #FS 605. U.L. Listing #CJ1184.

PART 3 - EXECUTION

3.01 PREPARATION

A. Install piping in accordance with NFPA 13 for sprinkler systems, NFPA 14 for standpipe and hose systems, and NFPA 24 for service mains.

B. Connect to site fire service installed under another section. Verify the site with civil drawings for the exact size and location of the service prior to beginning work.

C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

D. Install piping to conserve building space, to not interfere with use of space and other work.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers form reinforcement concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

H. Pipe Hanger and Supports:
   1. Install in accordance with NFPA 13.
   2. Hangers on branch lines to comply with NFPA 13, 9.2.3.
   3. Hangers on mains to comply with NFPA 13, 9.2.4.
   4. All hangers to be a maximum of 12 inches from the end of a branch line or an arm-over for a drop.
   5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple trapeze hangers may be used.
   7. Provide copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

I. Slope piping and arrange systems to drain at low points.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coast of zinc rich primer to welding.

K. Do not penetrate building structural members unless indicated.

L. Provide sleeves when penetrating floors and wall. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

N. Die cut threaded joints with full cut standard taper pipe threads and connect with Teflon tape or Teflon pipe compound applied to male threads.

O. Install valves with stems upright or horizontal, not inverted.

P. Provide valves for shut-off or isolating service and where shown on plans.

Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

R. Install piping in attic directly on top of joists. Install plastic sheeting over top of pipe and secure joists. Insulation to be installed over pipe and plastic sheeting.

S. Provide automatic sprinkler coverage at the bottom of hydraulic elevator shafts and elevator machine room in Accordance with NFPA 13 and local requirements.

T. Exterior exposed equipment shall be chrome plated.

U. All fire department or maintenance connections shall be coordinated with the Fire Department.

V. The fire protection contractor is responsible for coordination and labelling of fire devices supplied under this specification.

W. Where pipes penetrate exterior or finished surfaces escutcheons shall be used. Escutcheons shall be chrome finished and single piece design.

X. All devices and equipment shall be labelled as required by NFPA 13.

1.00 GENERAL:

1.01 SCOPE:

A. Include Section 15410 "GENERAL PROVISIONS - PLUMBING AND FIRE PROTECTION", with this Section.

B. Repair existing insulation at points of connection to existing work.

C. "Exposed" is defined as: Exposed to view when construction is complete. Items which are not "exposed" are "concealed".

D. Insulate all items subject to sweating or loss of heat.

E. All insulation shall be installed by licensed applicator and applied in accordance with the Manufacturer's Recommendations.

1.02 INSULATION REQUIREMENTS:

A. Comply with NFPA 90A.

B. Pipe hanger saddles are specified in Section 15450 "MATERIALS AND METHODS - PLUMBING"

C. Use insulation and adhesives with Underwriter's Laboratories flame spread rating not over 25 without evidence of continued progressive combustion, and smoke developed rating not exceeding:

1. 50 for pipe covering located in air ducts, plenum or casing.

2. 150 for all other pipe, and equipment insulation.

2.00 PRODUCTS:

2.01 FIBERGLASS PIPE COVERING:

A. Snap-on glass fiber insulation minimum density 5#/cu. ft. maximum thermal conductivity at 75°F mean temperature 0.25 BTU/(hr) (sq. ft.) (°F/in.) with UL rated vinyl coated and embossed vapor barrier laminate of aluminum foil and kraft reinforced with glass fiber yarns (ASJ).

B. For all lines seal jacket with self sealing lap and staple with outward clinching staples 3" o.c. Butt adjoining sections of insulation tightly and seal with self-adhering butt joint strips.

C. Cover fittings to thickness of adjacent covering with factory pre-molded fitting covers. Cover flanged valve bodies with flanged unions. Do not cover screwed unions on hot lines. Finish fittings with a skim-coat of insulating cement and when cement is dry fitting shall be covered with glass fab and vinyl acrylic mastic. Finish fittings exposed in equipment rooms, boiler room, and in finished spaces with vinyl acrylic mastic over glass fab.

D. At Contractor's option, concealed tees may be insulated with field fabricated tee covers consisting of straight pipe covering on run of tee with notch at branch together with pipe covering on branch contoured to fit notch. Glass fab shall be applied around main, lapping contoured joint at branch by 1" minimum for the full circumference of joint. Cover entire fitting covering with vinyl- acrylic mastic over glass fab, 1/8" thick (dry) coat. Submit sample of fabricated tee covering to Architect for approval before work is begun.

2.02 ALUMINUM JACKET PIPING COVER:

A. 0.010" thick corrugated aluminum jacket with laminated polyethylene and draft paper adhered liner.

B. Securely rivet jacket in place and band with flat aluminum bands 18" o.c.

C. Finish fittings on aluminum jacketed lines with 1/8" thick (dry) coat of vinyl acrylic mastic reinforced with glass cloth.

2.03 MANUFACTURERS

A. Acceptable Manufactures for Fiberglass Insulation Materials:
1. Owens-Corning.
2. Certaniteed.
3. Knauf.
4. Manville Corporation

B. Acceptable Manufacturers for Foamed Plastic Closed Cell Elastometric Insulation Materials:
1. Armstrong AP.
2. Rubatex.

C. Acceptable Manufacturers for Adhesives, Mastics and Coatings:
1. Armstrong.
2. Benjamin Foster.
3. Childers.
4. Marathon.

D. Acceptable Manufacturers for Metal Jackets:
1. Childers.
2. Manville Metal-Loc.

2.04 SCHEDULES - PIPING

A. Plumbing Piping:
1. Domestic Cold Water Interior, Above Grade:
a. Glass Fiber Pipe Insulation
1) All pipe sizes: 1 inch thick.
2) Pipes located in walls: ½ inch thick.
b. Foamed Plastic Pipe Insulation
1) All pipe sizes: 1 inch thick.
2) Pipes located in walls: ½ inch thick.
2. Domestic Hot and Recirculating Water Interior, Above Grade:
a. Glass Fiber Pipe Insulation
1) All pipe sizes: 1-1/2 inch thick.
2) Pipe located in walls: 1 inch thick.
b. Foamed Plastic Pipe Insulation
1) All pipe sizes: 1 inch thick.
2) Pipes located in walls: ½ inch thick.
3. Floor Drain Bodies, Traps and Waste Piping Between Floor Drain and Waste Stack for Floor Drains Serving Refrigeration Equipment, Ice Machine and AC Units; Interior, Above Grade:
a. Glass Fiber Pipe Insulation
1) All pipe sizes: 1 inch thick.

2.05 INSTALLATION – EQUIPMENT INSULATION GENERAL

A. Install in accordance with NAIMA Insulation Standards.

B. Factory Insulated Equipment: Do not insulate.

C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires or bands.

E. Fill joints, cracks, seams and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Insulated equipment containing fluids below ambient temperature: Insulate entire system.

G. Finish insulation at supports, protrusions, and interruptions.

H. Equipment in Mechanical Rooms or Finished Spaces: Finish with canvas jacket or as scheduled.

I. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.

J. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

K. Install in accordance with NAIMA National Insulation Standards.

L. Exposed Piping: Locate insulation and cover seams in least visible locations.

M. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

N. Fit pipe hangers over insulation.

O. Inserts and Shields:
   1. Application: Protect insulated piping at hangers and supports with insulation shield. On pipe sizes over 2 inches, provide insert.
   2. Insulation Protection Shield: Galvanized steel formed in half circle to fit insulation. Length and gauge as follows:
      a. Up to NPS 4: 12 inches long and 22 gauge.
      b. NPS 6: 18 inches long and 22 gauge.
      c. NPS 8 through 12: 24 inches long and 18 gauge.
      d. NPS 14 and Large: 24 inches long and 16 gauge.
   3. Insulation-Insert Material: Water repellent treated, ASTM C533, Type I calcium silicate; or ASTM C552, Type II cellular glass of same thickness and vapor barrier jacket specified for surrounding insulation. Insert shall be a minimum of 2 inches longer than the shield.
   4. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
   5. For Clevis Hangers: Insert shall cover lower 180 degrees of pipe.
   6. Option: At Contractor's option, insert may be factory fabricated Thermal Hanger Shield (insulation insert encased in sheet metal shield) equal to Pipe Shield, Inc. "Insulated Pipe Supports."

P. Continue insulation through metal studs, walls, sleeves, pipe hangers, and other pipe penetrations. Finish firestopping at supports, protrusions, and interruptions. At fire separations, refer to Division 7 and Section 15410: Sleeves.

Q. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.00 EXECUTION:

3.01 PLUMBING PIPING INSULATION:

A. Bodies of floor drains serving refrigeration equipment, AC units and ice machines and traps and waste piping between such drains and waste stack: "Fiberglass Pipe Covering". 1" thick.

B. Cold water piping, interior, above grade: "Fiberglass Pipe Covering", 1" thick. Pipe insulation in partitions and chases may be 1/2" thick “Arma-cell” or approved equal.

C. Hot and Hot Water Return water piping, interior, above grade: "Fiberglass Pipe Covering", 1" thickness. Pipe insulation in partitions and chases may be 1/2" thick “Arma-cell” or approved equal

D. Exposed P-Traps, stops and supplies on handicapped lavatories, and sinks. Equal to "PRO-WRAP" by McGuire.

E. Insulation with aluminum jacket: All exposed hot and cold water piping in Mechanical Rooms, Janitor's Closets and Water Heater Rooms.

1.00 PRODUCTS:

1.01 SCOPE:

A. Include Section 15410, "GENERAL PROVISIONS – PLUMBING AND FIRE PROTECTION ", with this Section.

B. Pay particular attention to requirements in the General Provisions for substitution of products not named or listed as substitutions.

2.00 PRODUCTS:

2.01 CLEANOUTS:

A. Furnish and install cleanouts where indicated on drawings and at all 90-degree bends, angle, upper terminals and not over 50 feet apart on straight runs. All cleanouts to have bronze countersunk tapered slotted plugs, except acid waste piping cleanouts, which shall be standard of piping system used. Flush-with-floor cleanout access covers shall have non-skid covers. All wall cleanout access covers shall have polished satin finish. All cleanouts shall be full size of pipe, piping larger than 6" shall have minimum 6" cleanout covers.

B. Exposed Cleanouts: Cast brass plug type, J.R. Smith #4470.

C. Wall type cleanout plug and access covers, J.R. Smith #4472. Cleanout plug must be within 1" of finish wall and must be tapped for access cover.

D. Install wall cleanouts on stacks at flush valve fixtures 12" above top of flush value, 12" above finish floor on sinks, lavatories and water coolers and 12" above grab bars at fixtures with grab bars. Locate cleanouts to clear baseboard at floor.

E. Floor type cleanout access covers: J.R. Smith #4248-NB. Plug must be within 3" of finished floor. Grout cleanout below access cover to seal watertight.

F. Outside Cleanouts: J.R. Smith #4258 cleanout access encased in a 18" X 18" X 6" deep concrete pad. See Detail on Drawings.

2.02 REDUCED PRESSURE ZONE BACKFLOW PREVENTER AND DOUBLE CHECK VALVE ASSEMBLIES:

A. One (1) inch and larger: Equal to Watts #909 with gate valves and inlet strainer. Provide additional valve upstream of strainer. Clayton, Beeco, Febco, Conbraco, Wilkins or equal. Provide same size as piping.

B. One-half (1/2) inch and three-fourth (3/4) inch: Watts #9D, Wilkins #750, same size as pipe.

C. Pipe relief from backflow preventer full size to nearest floor drain. Provide factory made air gap for relief connection.

D. Double check valve assemblies: Watts, Clayton or Beeco.

2.03 PLUMBING FIXTURES AND EQUIPMENT:

A. All “wetted” domestic potable fixtures, piping materials, valves shall meet the Federal Lead Free Guidelines. All materials shall be clearly marked and submitted with complete data during submittal review.

B. Unless otherwise specified, all fixtures complete as catalogued, commercial grade, white color,

exposed metal trim chromium plated.

C. Fixtures and brass shall be securely anchored. Carriers shall be securely anchored to floor with lug bolts in all holes as recommended by the manufacturer.

D. Flush valve "YJ" supports shall be installed 1" below vacuum breaker on all water closet flush valves
and around vacuum breaker on urinals.

E. Seal all fixtures at wall and floor with white silicone sealant. Seal countertop fixtures with clear silicone sealant.

F. Mount all fixtures at standard mounting height unless otherwise noted.

G. Furnish sinks and lavatories with correct number of drilling required by the faucet and accessories. Cock hole covers are not acceptable.

H. All items complete as catalogued as shown on drawings.

2.04 SUBSTITUTE MANUFACTURERS:

A. Where Kohler is listed above, Crane, Eljer, American Standard or Zurn may be substituted.

B. Where J.R. Smith is listed above, Josam, Zurn or Wade may be substituted.

C. Where Elkay water coolers are mentioned above, Halsey Taylor, or Oasis may be substituted, only if water ways are constructed of totally lead free materials.

D. Where McGuire is listed above for traps, outlets and stops, EBC, Kohler, Crane, Eljer or American Standard may be substituted.

E. Where Symmons is listed above, Chicago Faucet or Powers, Zurn may substituted.

F. Where Chicago Faucet is listed, T&S Brass may be substituted.

G. Where Elkay sink (s) are listed above, Just may be substituted.

H. Where Church is listed above, Bemis, Beneke or Centoco may be substituted.

I. Where Lochinvar tank type water heaters are listed, A.O. Smith or Rheem may be substituted.

J. Where Stern Williams is listed above, Fiat may be substituted.

K. Where Sloan is listed, Toto and Zurn may be substituted.

L. Where Symmons is listed above for shower control valves, Speakman, Leonard, Powers, T&S or Zurn may be substituted.

M. Where Armstrong is listed above, the equal of B & G, Taco, Grundfos or Thrush may be substituted.

N. Where Lawler is listed above for thermostatic mixing valves, Zurn or Symmons may be substituted.

3.00 EXECUTION:

3.01 INSTALLATION:

A. Equipment shall be installed in accordance with manufacturer's recommendation.

B. See details for mounting instruction and accessories.

C. Install electric water heaters so elements can be removed without disconnecting and/or removing heater.

D. Cleanouts on water closet stacks shall be installed minimum 12" above top of the flush valve on standard water closets, minimum 12" above top of grab bar on handicapped water closets and minimum 12" above tope of tanks on non-handicapped tank type water closets. On urinal locate cleanouts minimum 12" above top of flush valve on handicapped urinals and 12" above finish floor on standard units. On lavatories and sinks - 12" above finish floor and all other fixtures 12" above floor or above top of fixture.

F. Stops and supplies are to be installed with chrome plated brass nipples penetrating wall with deep escutcheon at wall. Compression type stops are not acceptable.

G. All floor mounted fixtures supports are to be securely attached to the floor using anchors in all mounting hole of size as recommended by manufacturer.

H. Provide wood backing in wall at all flush valve brackets and faucet supports and anchor brackets and supports to wood backing with anchors of sufficient length to penetrate backing.

I. Handicapped flush valve shall be installed with the pull handle on the open side or side opposite the adjacent wall.

1.0 GENERAL:

1.0 SCOPE:

A. Provisions of this Section apply to all HVAC work.

2.0 PRODUCTS:

2.1 VENTS FOR GAS FIRED EQUIPMENT:

A. ***Round*** double wall gas vent UL listed for installation with 1" clearance from combustible materials.

B. Inner wall shall be aluminum and outer wall galvanized steel.

C. Equipment vents with all necessary fitting and accessories including roof flashing, counter flashing, wall sleeves, firestop spacers, tees, elbows, and (Breidert) weather cap. Support vents in accordance with manufacturer's instructions.

D. Provide tee for connection of vent from domestic water heater.

E. Vent shall be full size of appliance draft or of size required by code whichever is larger.

2.2 CONCENTRIC THRU WALL FURNACE VENT AND COMBUSTION AIR:

A. To be furnished by Furnace Manufacturer, in accordance with A.G.A. and shall be U.L. Listed.

B. Provide combination air intake/flue pipe and horizontal vent cap.

3.0 EXECUTION:

3.1 INSTALLATION:

A. Equipment shall be installed in accordance with manufacturer's recommendations.

B. See Details for mounting instructions and accessories.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Design Data: Indicate refrigerant pipe sizing and lengths.

C. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

E. Warranty: Submit manufacturer’s warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

F. Project Record Documents: Record actual locations of components and connections.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Filters: One of each type and size.

1.02 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fabricate and label refrigeration system to comply with ASHRAE 15, “Safety Standard for Refrigeration Systems.”

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience and approved by manufacturer.

1.03 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.04 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
   1. Warranty Period:
      a. For Compressor, Parts, & Labor: One year(s) from date of Substantial Completion

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Corporation

B. Trane Inc / Mitsubishi

C. Bryant

D. Daikin Applied

2.02 SYSTEM DESIGN

A. Mini-Split System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
   1. Heating and Cooling: Air-source electric heat pump with variable capacity compressors.
   2. Provide insulated refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed.

3. System shall have a self-diagnostic function and shall have automatic restart capability after a power failure has occurred.

B. Performance Requirements: See Drawings for additional requirements.
   1. Efficiency:
      a. Comply with ASHRAE Std 90.1-2013.

2.03 INDOOR UNITS FOR DUCTED SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired, and run tested unit consisting of cabinet, supply fan, factory wiring, piping, electronic modulating linear expansion device, controls, and accessories; wired for single power connection with control transformer.
   1. Cabinet:
      a. Heavy gauge galvanized steel and internally insulated.
   2. Supply Fan: Indoor fan statically and dynamically balanced to run on a single motor with permanently lubricated bearings. Direct-drive type.
   3. Air Filters: Removable, 1” thick, 30% efficient air filter unless otherwise indicated.
   4. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections. All coils shall be pressure tested at the factory. A drain pan level switch, designed to connect to the control board, shall be provided, and installed in the condensate pan to prevent condensate overflow.

2.04 INDOOR UNITS FOR DUCTLESS SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired, and run tested unit consisting of cabinet, supply fan, factory wiring, piping, electronic modulating linear expansion device, controls, and accessories; wired for single power connection with control transformer.
   1. Cabinet:
      a. Heavy gauge galvanized steel and internally insulated.
   2. Supply Fan: Indoor fan statically and dynamically balanced to run on a single motor with permanently lubricated bearings. Direct-drive type.
   3. Air Filters: Removable, washable air filter.

B. Evaporator Coils Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections. All coils shall be pressure tested at the factory. A drain pan level switch, designed to connect to the control board, shall be provided, and installed in the condensate pan to prevent condensate overflow.

2.05 OUTDOOR UNITS

A. Outdoor Units: The outdoor unit shall be specifically matched to the corresponding indoor unit size. The outdoor unit shall be complete factory assembled and pre-wired with all necessary electronic and refrigerant controls. The outdoor unit shall be controlled by a microprocessor and dedicated Electronic Expansion Valves shall be provided for capacity control during part load of the indoor unit. Easy access shall be afforded to all serviceable parts by removable access panels.
   1. Refrigerant: R-454B.
   2. Cabinet: Galvanized steel with baked enamel finish. Completely weatherproof and corrosion resistant. Steel mounting feet to allow bolting to a concrete pad or mounting bracket. Assembly shall withstand lateral wind gust up to 155 MPH to meet applicable codes.

B. Compressor: Hermetic, inverter driven, variable speed, high pressure control and internal thermal overload protection. Compressor shall be mounted as to avoid the transmission of vibration.

C. Air Cooled Condenser: Aluminum fin and copper tube coil with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
   1. Condenser Fans: Direct-drive propeller type with fan guard to prevent contact. Airflow shall be horizontal discharge.
   2. Condenser Fan Motor: Permanently lubricated

D. Mounting Pad: poured in place concrete pad, minimum 4 inches thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install units level and plumb.

C. Install in accordance with NFPA 90A and NFPA 90B.

D. Install refrigeration systems in accordance with ASHRAE Std 15.

E. Install roof-mounted, compressor-condenser components on equipment supports. Anchor units to supports with removable, cadmium-plated fasteners.

F. Install ground-mounted, compressor-condenser components on cast-in place concrete equipment base(s).

G. Install tubing to allow access to unit.

3.03 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

END OF SECTION

1.0 - GENERAL

1.1 Scope

A. Provisions of this Section shall apply to all HVAC work.

2.0 - PRODUCTS

2.1 ENERGY RECOVERY UNITS:

A. Unit shall be fully assembled at the factory and consist of an insulated metal cabinet, condensate drain pan, total enthalpy energy core, compressed refrigerant coils, hot gas reheat coil, electric post-heater, motorized dampers, motorized recirculating damper, filter assembly for intake air and exhaust air, supply air blower assembly, exhaust air blower and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.

B. Cabinet:

1. Materials: Formed, insulated double wall construction, fabricated to permit access to internal components for maintenance. Outside casing: 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Pre-painted components as supplied by the factory shall have polyester urethane paint on 18 gauge G60 galvanized steel. Internal assemblies: prepainted 20 gauge galvannealed steelexcept for motor supports which shall be 14 gauge galvanized (G90) steel.

2. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.

   A. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below. Thickness: 1 inch. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411. Location and application: Full coverage of entire cabinet exterior to include walls and roof of unit. Insulation shall be of semi-rigid type and installed between inner and outer shells of all cabinet exterior components.

   B. Materials: Rigid urethane foam. Thickness: 1 inch. Meets UL94HF-1 flame requirements. Location and application: Doors and the floor of the unit.

3. Access panels / doors: Unit shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components. Doors and access panels shall be fabricated of 18 gauge galvanized G90 steel.

4. Condensate drain pan: Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded drain connection at the front for connection to a P trap. Drain pan shall be sloped in two directions to provide positive draining.

5. P trap: An engineered P trap (condensate drain) assembly shall be

provided for each unit, to include cleanout ports, cleanout tool, vacuum break device and see-through reservoir to permit visual verification of water or glycol solution levels.

6. The air-handling unit shall have a total enthalpy energy core sized per the ventilation requirement of the unit. Mixed air units with economizing shall be constructed with internal bypass dampers such that the pressure drop across the core does not increase during economizing.

7. Supply Air and Exhaust Air blower assemblies: Blower assemblies consist of an electric motor and a belt driven blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motors shall be capable of continuous speed modulation and controlled by a VFD.

8. Control panel / connections: Energy Recovery Unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections.

9. Shall be encased in a weather-tight metal housing with intake air vents. Large, metal lift-off or hinged door shall provide easy access to the enclosed vest plate, control circuitry, gas train, burner assembly and exhaust blower.

10. Motorized dampers / Intake Air, Motorized dampers of low leakage type shall be factory installed.

11. Motorized Recirculating Air Damper designed to permit 100% recirculation of exhaust air shall be factory installed. Damper shall be controlled by 2-position switch.

12. Evaporator Coil: Evaporator coil shall be AHRI Certified and shall be (silver) soldered or brazed into the compressed refrigerant system. Coil shall be constructed of copper tubing, permanently bonded to aluminum fins and enclosed in a galvanized steel frame. If two compressors are used as components of the unit, then the evaporator coil shall be of “interlaced” configuration, permitting independent operation of either compressor without conflict with the other compressor.

13 Reheat Coil with factory installed modulating hot gas reheat valve.

C. Blower Section:

1. Blower section construction, Supply Air and Exhaust Air: Belt drive motor and blower shall be assembled onto a 14 gauge galvanized steel platform and must have neoprene vibration isolation devices. Blower assemblies shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

2. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.

3. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with set screws.

4. Blower section motor source quality control: Blower performance shall be

factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating".

D. Motors:

1. General: Blower motors greater than 3/4 horsepower shall be "NEMA Premium" unless otherwise indicated. Compliance with EPAct minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 05 13, matched with fan load.

E. Filter Section:

1. Energy Recovery Unit shall have permanent metal filters located in the outdoor air intake and shall be accessible from the exterior of the unit. MERV 8 pleated filters shall be provided in the intake air stream and MERV 8 filters in the exhaust air stream.

F. Installation:

1. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's IOM, Best Practices and all applicable building codes.

G. Field Quality Control:

1. Manufacturer's Field Service: Engage a factory authorized service representative to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to A / E in writing. Inspection must include a complete startup checklist to include the following: Completed Start-Up Checklists as found in manufacturer's IOM.

H. Start-up Service:

1. Engage a factory authorized service representative to perform startup service. Clean entire unit, comb coil fins as necessary, install clean filters. Verify water source for compliance with manufacturer's requirements for flow and temperature. Measure and record electrical values for voltage and amperage.

I. Training:

1. Engage a factory authorized service representative to train owner's maintenance personnel to adjust, operate and maintain the entire energy recovery unit.

J. Warranty:

1. 2 year whole unit warranty, 5 year non-prorated compressor warranty.

K. Split System Energy Recovery Units shall be manufactured by Trane, Carrier, Valent, Renew Aire, or approved equal.

3.0 – EXECUTION

3.1 INSTALLATION:

A. Units shall be installed in accordance with manufacturer's recommendations.

B. See Details for mounting instructions and accessories.

C. Manufacturer shall provide field start-up of all units.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. Provisions of this section apply to all HVAC work.

PART 2 PRODUCTS

2.01 ELECTRIC WALL HEATERS

A. UL listed recessed convection heaters with finned sheathed heating elements, resiliently mounted direct driven propeller fan with motor heat shield, circuit breaker, concealed thermostat, concealed "On Off" switch, high limit controls, and junction box for connecting power wiring.

B. Cabinets: 16 gauge steel, with pencil proof welded steel bar grilles (bars 1/16" X 3/8" minimum). Equip cabinet with adjustable recessing frame. Finish: Baked enamel, over bonderizing. Architect will select the color from manufacturer's standard selections.

C. Electric Wall Heaters: 2 KW and larger, Markel 3400 Series, less than 2 KW, Markel Series 3420, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Units shall be installed in accordance with manufacturer’s recommendations.

B. See details for mounting instructions and accessories.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.

C. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2018.

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Structural Performance: Casings shall be fabricated to withstand 133 percent of the indicated static pressure without structural failure. Wall and roof deflection at the indicated static pressure shall not exceed 1/8 inch per foot of width.
   1. Fabricate outdoor casings to withstand wind load of 15 lbf/sq. ft. and snow load of 30 lbf/sq. ft.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.03 SUBMITTALS

A. Product Data: For each type of the following products:
   1. Liners and adhesives
   2. Sealants and gaskets

B. Shop Drawings: For ducts. Include plans, elevations, sections, components, and attachments to other work.
   1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   2. Factory- and shop-fabricated ducts and fittings.
   3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
   4. Elevation of top of ducts.
   5. Dimensions of main duct runs from building grid lines.
   6. Fittings.
   7. Reinforcement and spacing.
   8. Seam and joint construction.
   9. Penetrations through fire-rated and other partitions.
   10. Equipment installation based on equipment being used on Project.
   11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
   12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
   13. Provide shop drawings for all mechanical rooms.

C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

1.05 FIELD CONDITIONS, DELIVERY, STORAGE, AND HANDLING

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

C. Seal all joints and seams of ductwork as it is installed.

D. During construction, cover open ended ductwork sections to prevent dust and water from entering ductwork sections.

E. Do not store ductwork on site in direct contact with dirt, gravel, finished concrete floor, etc.

F. During construction, all return air, exhaust air, and outside air ductwork shall have temporary filter media installed over all openings. The mechanical contractor shall be responsible for providing temporary filter media and changing filter media on a bi-weekly basis during construction. The general contractor shall maintain a log of all temporary media and filter changes recording the following: Associated Unit Tag, Room Location, Filter Size & Quantity or Temporary Media Quantity, Date & Time of replacement, Mechanical Contractor signature, and General Contractor signature.

PART 2 PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-

support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.03 DOUBLE-WALL ROUND DUCTS AND FITTINGS

A. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

B. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Inner Duct: Minimum 0.028-inch perforated galvanized sheet steel having 3/32-inch-diameter perforations, with overall open area of 23 percent.

D. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

E. Interstitial Insulation: Flexible elastomeric duct liner complying with ASTM C 534, Type II for sheet materials, and with NFPA 90A or NFPA 90B.

1. Maximum Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at75 deg F mean temperature.

2.04 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.05 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:
   1. Application Method: Brush on.
   2. Solids Content: Minimum 65 percent.
   3. Shore A Hardness: Minimum 20.
   4. Water resistant.
   5. Mold and mildew resistant.
   6. VOC: Maximum 75 g/L (less water).
   7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
   8. Service: Indoor or outdoor.
   9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Solvent-Based Joint and Seam Sealant:
   1. Application Method: Brush on.
   2. Base: Synthetic rubber resin.
   3. Solvent: Toluene and heptane.
   4. Solids Content: Minimum 60 percent.
   5. Shore A Hardness: Minimum 60.
   6. Water resistant.
   7. Mold and mildew resistant.
   8. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
   9. Service: Indoor or outdoor.
   10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.
   1. General: Single-component, acid-curing, silicone, elastomeric.
   2. Type: S.
   3. Grade: NS.
   4. Class: 25.
   5. Use: O.

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:
   1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.
   2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
   3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.06 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:
   1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
   2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
   3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.07 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.

B. Unless otherwise shown or specified construct ducts of galvanized steel sheet metal using gauges and recommended details as contained in the current edition of the SMACNA HVAC Duct Construction Standards. Ductwork shall include supply air, exhaust air, return air, and outdoor air ducts, together with all necessary fittings, splitters, dampers, quadrants, flexible connections, sleeves, hangers, support, braces, etc. Hang and install ducts in a neat and first class manner from structural members (not roof deck) with adequate bracing and cross breaking to prevent breathing, rattling, and vibration.

C. Flexible ductwork is not allowed on return, exhaust, or outside air ductwork.

D. **Duct dimensions shown are clear inside dimensions. Increase sheet metal size to allow for liner thickness.**

E. Duct Sealing: Seal all duct seams and joints as noted below. Seal entire circumference of all branch duct connections, tapping collars and spin-ins. Seal ducts using mastic sealant equal to United Duct Sealer.
   1. Class "A" Seal: Seal all joints and seams and leak test as specified.
   2. Class "B" Seal: Seal entire circumference of all transverse joints, seal all longitudinal joints.
   3. Class "C" Seal: Seal entire circumference of all transverse joints.
   4. Class "D" Seal: Seal corner of transverse joints.

F. Low Pressure Supply Ductwork and Outside Air Ductwork:
   1. 2 inch w.g. pressure class.
   2. Galvanized Steel.
   3. Class "B" Seal.
   4. Bolts, screws, and other fasteners shall not penetrate the ductwork.

G. Return and Relief Ductwork:
   1. 2 inch w.g. pressure class.
   2. Galvanized Steel.
   3. Class "B" Seal.

H. Exhaust Ductwork:
   1. 2 inch w.g. pressure class.
   2. Galvanized Steel.
   3. Class "B" Seal.

I. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fiberglass ductboard.

J. Kitchen Hood Exhaust Ductwork:
   1. 2 inch w.g. pressure class.
   2. Kitchen exhaust ducts shall be 18 gauge, type 316 stainless steel with all seams and joints welded.
   3. Make final duct connections to kitchen hoods under this Section. Hoods will be installed under other Section.
   4. Install access doors 20 feet on centers in sides of kitchen exhaust ducts.
   5. Kitchen exhaust ductwork shall be sloped toward the hood. Slope ductwork minimum of 1/4 inch per 12 inches (2% slope).
   6. Ductwork shall be tested to determine that all welded joints are liquid tight.
   7. Bolts, screws and other fasteners shall not penetrate the ductwork.
   8. Install trapped drain at foot of exhaust riser and extend 1" copper drain line to nearest floor drain or outdoors.

2.08 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation

E. Duct Turns: Wherever possible, duct turns shall have a centerline radius equal to 1.5 times the duct width in the plane of the turn. Install turning vanes in other duct turns to provide a dynamic loss coefficient ("C") not greater than 0.2. Duct turns less than 20 degrees may be mitered. Do not use offsets that reduce the cross sectional area of the duct. Do not use reducing elbows or tees.

F. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.

G. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

H. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.09 MANUFACTURED DUCTWORK AND FITTINGS

A. Double Wall Insulated Round Ducts: Round spiral lockseam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with solid inner wall.
   1. Manufacture in accordance with SMACNA (DCS).
   2. Insulation:
      a. Thickness: 1 inch (25 mm).
      b. Material: Air.

B. Round Ducts (concealed above ceilings): Round lockseam duct with galvanized steel outer wall.
   1. Manufacture in accordance with SMACNA (DCS).

C. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
   1. Insulation: Fiberglass insulation with polyethylene vapor barrier film. Minimum R=6.0
   2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
   3. Maximum Velocity: 4000 fpm.
   4. Temperature Range: Minus 10 degrees F to 160 degrees F.
   5. Flexible connectors shall not exceed 5 feet in length.
   6. UL Listed as Class I Air Duct and Connector (UL 181)
   7. Manufacturers:
      a. Thermoflex
      b. Technaflex
      c. Flexmaster
      d. Atco

2.10 FIBROUS GLASS DUCTS (FOR TRANSFER AIR DUCTWORK ONLY)

A. Fibrous Glass Ducts: 1 inch thick rigid glass fiber with aluminum foil, glass scrim and Kraft or plastic jacket vapor barrier; maximum 0.23 K value at 75 degrees F.
   1. UL labeled to UL 181.

B. Fabricate in accordance with SMACNA (FGD), except as indicated.

C. Machine fabricate fibrous glass ducts and fittings. Make only minor on site manual adjustments.

D. Staple duct joints and tape with 3 inch wide 2 mil thick or 2 inch wide 3 mil thick aluminum pressure sensitive tape, UL approved.

E. Staple duct joints and tape with 2-1/2 inch wide pressure sensitive tape, UL approved.

F. Staple duct joints and tape with 3 inch wide heat activated chemical bonding tape.

G. Do not use fibrous glass ducts within 12 inches of electric or fuel fired heaters.

H. Maximum stress exerted on structural steel members: 22000 psi.

I. Maximum temperature: 250 degrees Fahrenheit.

J. Conform to safety standards NFPA 90A and NFPA 90B.

PART 3 EXECUTION

3.01 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

M. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

N. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

O. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

P. Use double nuts and lock washers on threaded rod supports.

Q. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

R. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

S. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

T. Flexible duct is not allowed on return, exhaust, or outside air ductwork.

U. Bolts, screws, and other fasteners shall not penetrate the ductwork.

3.02 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

F. All ductwork exposed in finished spaces shall be provided with Paint grip finish. Paint color to be selected by Architect.

3.03 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Where practical, install concrete inserts before placing concrete.
   2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
   3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
   5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.04 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
   1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
      a. Special fittings.
      b. Manual volume damper installations.
      c. Control-damper installations.
      d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
      e. Duct security bars
      f. Wiring Diagrams: For power, signal and control wiring.
      g. Ceiling-mounted access panels/doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

C. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

D. Project Record Drawings: Record actual locations of access doors and test holes.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Fusible Links: Furnish two or quantity equal to 10 percent of amount installed, whichever is greater, of each type and size.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.03 FIELD CONDITIONS, DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653.

B. Stainless-Steel Sheets: Comply with ASTM A 480, Type 304

C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14;with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Hollow Vane and Rail (Double Wall Vane).
   2. Elgen Manufacturing, Inc.
   3. Krueger-HVAC, Division of Air System Components.
   4. Ruskin Company.
   5. Titus HVAC.

B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

C. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with push-pull operator strap.

2.04 BACKDRAFT & PRESSURE RELIEF DAMPERS - METAL

A. Manufacturers:
   1. Louvers & Dampers, Inc.
   2. Nailor Industries, Inc.
   3. Ruskin Company.

B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with neoprene or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.05 DUCT ACCESS DOORS

A. Manufacturers:
   1. Acudor Products Inc.
   2. Ductmate Industries, Inc.
   3. MKT Metal Manufacturing.
   4. Nailor Industries, Inc.
   5. Ruskin Company.
   6. SEMCO LLC.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1-inch-thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. Larger Sizes: Provide an additional hinge.
   5. High Temperature Duct Access Doors:
      a. Comply with NFPA 96.
      b. Comply with UL 1978.

D. Access doors with sheet metal screw fasteners are not acceptable.

2.06 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, airtight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.07 FIRE DAMPERS

A. Manufacturers:
   1. AireTechnologies, Inc.
   2. Nailor Industries, Inc.
   3. Ruskin Company.
   4. Greenheck

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Ceiling Radiation Dampers: Galvanized steel, 22 gage, 0.0299-inch frame and 16 gage, 0.0598-inch flap, two layers 0.125-inch ceramic fiber on top side and one layer on bottom side for round flaps, with locking clip.
   1. Boot Fitting: Factory-provided el type (90 degree). Include field-provided collar.
   2. Box Fitting: Factory-provided 26 gage, 0.0179 inch with field-provided collar.
   3. Rated for three-hour service in compliance with UL 555C.

D. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299-inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

E. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

F. Multiple Blade Dampers: 16 gage, 0.0598-inch galvanized steel frame and blades, oil-impregnated bronze or stainless-steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

G. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.08 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric.
   2. Ductmate Industries, Inc.
   3. Elgen Manufacturing, Inc.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
      a. Net Fabric Width: Approximately 2 inches wide.
   2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.

D. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

E. Maximum Installed Length: 14 inch.

2.09 VOLUME CONTROL DAMPERS

A. Manufacturers:
   1. Greenheck.
   2. Nailor Industries.
   3. Ruskin Company.

B. Fabricate in accordance with SMACNA (DCS) and as indicated. Standard leakage rating, with linkage outside of airstream. Suitable for horizontal or vertical applications.

C. Splitter Dampers:
   1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
   2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
   3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.

D. Single Blade Dampers:
   1. Fabricate for duct sizes up to 6 by 30 inch.
   2. Blade: 24 gage, 0.0239 inch, minimum.

E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   1. Blade: 18 gage, 0.0478 inch, minimum.

F. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

G. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches provide regulator at both ends.

H. Constant Airflow Regulators:
   1. General Requirements:
      a. Provide bi-directional, air balancing regulator for pressure independent air volume control.
      b. Complies with UL 2043 for heat and smoke release.
      c. Complies with AMCA 500-D for the allowable leakage rates.
      d. Airflow regulator to be field adjustable.
   2. Construction:
      a. Nominal Diameter: 4 inch.
      b. Frame: Thermoplastic resin in compliance with UL 94.
      c. Blade: Thermoplastic resin in compliance with UL 94.
      d. Bearings: Hydraulic blade dampener.
      e. Outer Seal: Removable rubber gasket-type around circumference of damper.
      f. Spring: Stainless steel leaf-type.
      g. Temperature Range: 25 degrees F to 150 degrees F.
      h. Operating Range: 0.2 inch W.C. to 2.0 inch W.C..
   3. Optional Accessories:
      a. Provide airflow regulators with rectangular to round transitions.

2.10 MISCELLANEOUS PRODUCTS

A. Internal Strut End Plugs: Combination end-mounting and sealing plugs for metal conduit used as internal reinforcement struts for metal ducts; plug crimped inside conduit with outside gasketed washer seal.

B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
   1. Thickness: 2 mils.
   2. High tack water-based adhesive.
   3. UV stable light blue color.
   4. Elongation Before Break: 325 percent, minimum.

C. Smoke detectors will be furnished and wired under Electrical Work but shall be installed in ducts under this Section. Locate smoke detectors so that indicating lights are visible and so that they will not be affected by moisture from coils or humidifiers. Install access door in duct at each smoke detector.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS).

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 by 8 inch size for hand access, 12 by 12 inch size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

G. Demonstrate re-setting of fire dampers to Owner's representative.

H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

I. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

J. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.

K. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

L. Use splitter dampers only where indicated.

M. Provide balancing dampers on high velocity systems where indicated.

N. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

B. Manufacturer's Instructions: Indicate installation instructions.

C. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Fan Belts: One set for each individual fan.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.03 FIELD CONDITIONS

A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carnes

B. Greenheck

C. Loren Cook Company

D. PennBarry

E. Twin City Fan & Blower

F. ACME

2.02 POWER VENTILATORS - GENERAL

A. Provide fans of class required for service based on static pressures 20% greater than those scheduled. All fans are to be rated for continuous duty.

B. Provide forward curved blade, radial blade, backward curved blade or air foil blade fans statically and dynamically balanced.

C. Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

D. For all fans furnish adjustable motor bases or rails.

E. Size V belt drives for 50% overload, and provide adjustable pitch motor pulleys for drives of 15 BHP and smaller.

F. Provide belt and drive guards on all fans.

G. Provide scroll access doors with quick-operating latches for all exhaust fans.

H. Equip all fans with flanged inlets and outlets.

I. Sound power levels shall not exceed those scheduled or specified.

J. Size fan motors to provide at least 5% drive loss, with motor service factors not exceeding 1.0. Provide premium efficiency motors.

K. Where scheduled provide variable inlet vanes with rods extended for connection to control operators.

L. Where scheduled provide corrosion resistant coating consisting of two (2) coats of chlorinated rubber base paint on all parts in airstream.

M. Where shown on electrical drawings provide two (2) speed separate winding motors (1800/900 rpm).

N. Where shown on electrical drawings provide motors suitable for two (2) step increment starting.

O. All roof and wall mounted fans are to be factory painted, color to be selected by Architect.

P. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

Q. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

R. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

S. Fabrication: Conform to AMCA 99.

T. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

U. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

V. Enclosed Safety Switches: Conform to NEMA 250.

W. Kitchen Hood Exhaust Fans: Comply with requirements of NFPA 96 and UL 762.

2.03 CABINET EXHAUST FANS

A. Construction (Loren Cook GC-100): The fan wheel housing and integral outlet duct shall be injection molded from an engineered resin. The outlet duct shall have provision for an aluminum backdraft damper. The inlet box shall be minimum 22 gauge galvanized steel. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided.

B. Fan Wheel (Loren Cook GC-100): Wheel shall be centrifugal forward curved type, injection molded of polypropylene resin.

C. Construction (Loren Cook GC-200 to GC-900): The fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel. Motor shall be mounted on vibration isolators. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and nylon bushings. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided.

D. Fan Wheel (Loren Cook GC-200 to GC-900): Wheel shall be centrifugal forward curved type, constructed of galvanized steel.

E. Disconnect Switch: Cord and plug in housing for thermal overload protected motor.

F. Fan Speed Controller: Provide pre-wired 5A, 120 Volt fan speed controller. Fan speed controller shall be mounted on the fan or in location as shown on the construction documents.

G. Grille: Aluminum with baked white enamel finish.

H. Fan Motor: Motor shall be open drip proof type with permanently lubricated bearings and include impedance or thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.

2.04 INLINE CENTRIFUGAL FANS

A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing, resilient mounted motor, gravity backdraft damper in discharge.

B. Construction: The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene

gasketing. Pivoting motor plate shall utilize threaded L-bolt design for positive belt tensioning. Housing shall be pre-drilled to accommodate universal mounting feet for vertical or horizontal installation.

C. Nameplate: The fan shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM.

D. Fan Wheel: Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone.

E. Bearings: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

F. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor, and wall mounted multiple speed switch.

G. Belts and Drives: V-belt or direct driven as shown. Belts shall be oil and heat resistant, static conducting. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

H. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings.

I. Fan Speed Controller: Provide 5A, 120 Volt fan speed controller for all direct drive 120V fan motors. Fan speed controller shall be mounted on the fan or in location as shown on the construction documents.

J. Provide automatic belt tensioner for all belt drive fans.

2.05 MIXED FLOW – INLINE KITCHEN EXHAUST FAN

A. High efficiency mixed flow wheel.

B. Continuously welded steel housing with powder coated finish.

C. Welded straightening vanes, integral inlet and outlet collars.

D. Adjustable motor plate for belt tensioning.

E. L10/40K concentric locking regreasable bearings with extended lube lines, belt guard, lifting lugs and adjustable mounting feet.

F. UL listed for restaurant exhaust, steel drain connection and grease collection canister.

G. Loren Cook QMX.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counter flash duct to roof opening.

D. Provide sheaves required for final air balance.

E. Install backdraft dampers on inlet to roof and wall exhausters.

F. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

G. Equip exposed belt drives with belt guards with holes for measuring speeds of driven shafts.

H. Provide exposed couplings with coupling guards.

I. All motors or other equipment exposed to weather shall be provided with weatherproof covers.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide data for each type of product.
   1. Data Sheet: indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static pressure drop, and noise ratings.
   2. Diffuser Schedule: Submit schedule of outlets and inlets showing type, size, room location, accessories, and noise level.

1.02 CLOSEOUT DOCUMENTS

A. Project Record Documents: Record actual locations of air outlets and inlets.

1.03 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 GRILLES, REGISTERS, AND DIFFUSERS MANUFACTURERS

A. Titus

B. Metalaire

C. Price Industries

D. Krueger

E. Nailor

2.02 LOUVER MANUFACTURERS

A. Greenheck

B. NCA

C. Ruskin

D. Pottorf

2.03 GENERAL

A. Where fire dampers are required at grilles, provide steel grilles, not aluminum.

B. Grilles, Registers, and Diffusers Finishes:
   1. All diffusers and grilles located in lay-in ceilings: off-white enamel finish.
   2. All wall mounted grilles and registers: primer finish. (grilles and registers to be field painted by others.)
   3. All grilles and registers mounted on exposed ductwork: un-painted ductwork: mill finish
   4. All floor grilles: satin anodized finish.
   5. If there is a grille, register, or diffuser in a location other than what is described above, provide an off-white enamel finish.

C. Louver Finishes:
   1. Louver Finishes shall be selected by the Architect.
   2. Submit color chart to the Architect.

2.04 ROUND PLAQUE FACE CEILING DIFFUSERS

A. Type: Round, adjustable pattern, plaque face ceiling diffuser to discharge air in 360 degree pattern. Diffuser collar shall project not more than 1 inch above ceiling.

B. Fabrication: Outer cone and webbing is steel. Plaque is Aluminum.

C. Accessories: Radial opposed blade damper with damper adjustable from diffuser face.

D. Basis of Design: Titus R-Omni

2.05 RECTANGULAR LOUVER FACE CEILING DIFFUSERS

A. Type: Provide square, adjustable pattern, stamped, multi-core diffuser to discharge air in one way, two way, three-way, corner, or four-way discharge pattern. Four-way discharge shall be standard. See floor plans for direction of throw for anything other than four ways.

B. Connections: Round.

C. Frame: Provide lay-in border type. In plaster ceilings, provide plaster frame and ceiling frame. Coordinate border type with Architect's ceiling plans.

D. Fabrication: Aluminum with baked enamel finish.

E. Color: Standard off-white unless otherwise noted.

F. Accessories: Provide radial opposed blade volume control damper; removable core (latched in place) with damper adjustable from diffuser face.

G. Basis of Design: TDCA-AA (aluminum).

2.06 CEILING EGG CRATE EXHAUST, RETURN, AND TRANSFER GRILLES

A. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch grid core.

B. Fabrication: Grid core consists of aluminum with baked enamel finish.

C. Color: Standard off-white unless otherwise noted.

D. Color: As selected by Architect. Submit color chart to the Architect.

E. Color: As selected by the Engineer from manufacturer's standard range.

F. Frame: 1 inch margin with countersunk screw mounting.

G. Frame: Channel lay-in frame for suspended grid ceilings.

H. Accessories: Provide integral, gang & face operated opposed blade damper.

I. Basis of Design: Titus 50F.

2.07 WALL SUPPLY REGISTERS

A. Construction: 20 gauge steel border and extruded aluminum blades.

B. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille with two-way deflection.

C. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.

D. Fabrication: Aluminum extrusions with factory prime coat finish.

E. Color: Standard off-white unless otherwise noted.

F. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

G. Basis of Design: Titus 272RL

2.08 WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, horizontal face.

B. Frame: 1-1/4 inch margin with countersunk screw mounting.

C. Fabrication: Steel frames and blades, with factory baked enamel finish.

D. Color: Standard off-white unless otherwise noted.

E. Damper for Registers: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

F. For Grilles, same as above except no damper.

G. Basis of Design: Titus 350RL

2.09 MODULAR SLOT DIFFUSERS

A. Type: Modular slot, with adjustable vanes for left, right, or vertical discharge. Refer to plans for slot length & width and number of slots.

B. Fabrication: Aluminum extrusions with factory baked enamel finish.

C. Color: As selected by Architect. Submit color chart to the Architect.

D. Frame: 1-1/4 inch margin with support clips for T bar mounting, mitered end border.

E. Plenum: Integral, galvanized steel, insulated.

F. Basis of Design: Titus ML with MP plenum.

2.10 LOUVERS

A. Fabrication:
   1. Design: Stationary drainable louver type with drain gutters in each blade and head with downspouts in jambs and mullions with all welded construction. Hidden vertical supports to allow continuous line appearance up to 120 inches. Steeply angled integral sill.
   2. Frame:
      a. Frame Depth: 4 inches.
      b. Wall Thickness: 0.081 inch, nominal.
      c. Material: Extruded aluminum, Alloy 6063-T6.
   3. Blades:
      a. Style: Drainable. 37.5 degrees at 5-3/32 inches, nominal.
      b. Wall Thickness: 0.081 inch, nominal.
      c. Material: Extruded aluminum, Alloy 6063-T6.
   4. Minimum Assembly Size: 12 inches wide by 12 inches high.
   5. Maximum Factory Assembly Size: Single sections shall not exceed 120 inches wide by 90 inches high or 90 inches wide by 120 inches high. Louvers larger than the maximum single size shall be require field assembly of smaller sections.

B. Performance Data:
   1. Based on testing 48 inch x 48 inch size unit in accordance with AMCA 500.
   2. Free Area: 54 percent, nominal.
   3. Free Area Size: 8.58 square feet.
   4. Maximum Recommended Air Flow through Free Area: 873 feet per minute.
   5. Air Flow: 7490 cubic feet per minute.
   6. Maximum Pressure Drop (Intake): 0.15 inches w.g.
   7. Water Penetration: Maximum of 0.01 ounces per square foot of free area at an air flow of 873 feet per minute free area velocity when tested for 15 minutes.

C. Insulated Blank-Off Panels: 0.040 aluminum sheet, and 2 inches of insulation as scheduled or indicated, aluminum skin insulated core, factory installed with removable fasteners and neoprene gaskets. Install blank-off panels on all un-used louver sections.

D. Bird Screen:
   1. Aluminum, 5/8 inches by 0.040 inch, expanded and flattened.
   2. Frame: Removable.

E. Finish:
   1. Provide baked enamel finish. Color to be selected by Architect. Submit color chart to Architect.
   2. 20-year finish warranty.

F. Mounting: Furnish with interior flat flange for installation.

G. Basis of Design: Ruskin ELF375DX.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide manual volume dampers for balancing on duct take-off to all air outlets and inlets (diffusers, grilles, registers, etc), whether dampers are specified as part of the diffuser or grille and register assembly or not. All manual volume dampers may not be indicated on drawings.

C. Paint ductwork visible behind air outlets and inlets flat black.

D. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

E. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

3.02 DIFFUSERS, REGISTERS, & GRILLES

A. Examination
   1. Examine areas where diffusers, registers and grilles are installed for compliance for installation tolerances and other conditions affective performance of equipment.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation of Diffusers, Grilles, and Registers
   1. Install diffusers, registers, and grilles level and plumb.
   2. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
   3. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

C. Adjusting
   1. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.03 LOUVER INSTALLATION

A. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. Provisions of this section apply to all HVAC work.

PART 2 PRODUCTS

2.01 FILTERS - AIR

A. 30% Filters, 1" or 2" Thick (Maximum allowed by MFR): Throwaway deep pleated filters, maximum face velocity 350 fpm. Maximum initial pressure drop 0.1" WG, UL Class 1, 30% efficiency per ASHRAE Test Standard 52-76, minimum ratio of media area to face area 4.4:1. Turn system over to Owner with clean filters and provide one (1) set of spare filters. Farr 30/30 or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Filters shall be installed in accordance with manufacturer's recommendations.

B. See details for mounting instructions and accessories.

END OF SECTION

SECTION 15926 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.02 SUBMITTALS

A. Product Data: Provide data for each system component and software module.

B. Shop Drawings:
   1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
   2. List connected data points, including connected control unit and input device.
   3. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
   4. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
   5. Indicate description and sequence of operation of operating, user, and application software.

C. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

D. Designer's Qualification Statement.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

G. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
   1. Revise shop drawings to reflect actual installation and operating sequences.
   2. Include submittals data in final "Record Documents" form.

H. Operation and Maintenance Data:
   1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
   2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
   3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

I. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

1.03 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Designer Qualifications: Perform design of system software under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

E. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.04 WARRANTY

A. Correct defective Work within a five year period after Substantial Completion.

B. Provide five year manufacturer's warranty for field programmable micro-processor based units.

1.05 PROTECTION OF SOFTWARE RIGHTS

A. Prior to delivery of software, the Owner and the party providing the software will enter into a software license agreement with provisions for the following:
   1. Limiting use of software to equipment provided under these specifications.
   2. Limiting copying.
   3. Preserving confidentiality.
   4. Prohibiting transfer to a third party.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The HVAC controls system shall connect to the existing Trane Building Automation system at this school. Update all graphics at the front end to incorporate this project. All products and services associated with the Building Automation System shall be provided and installed by Trane.

2.02 SYSTEM DESCRIPTION

A. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.

B. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.

C. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.

D. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.

E. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

2.03 OPERATOR INTERFACE

A. PC Based Work Station:
   1. Resides on high speed network with building controllers.
   2. Connected to server for full access to all system information.

B. Workstation, controllers, and control backbone to communicate using BACnet Ethernet or MSTP protocol and addressing.

C. BACnet protocol to comply with ASHRAE Std 135.

D. LonTalk protocol to comply with CTA-709.1.

E. Hardware:
   1. Laptop:
      a. Laptop(s) to be provided by DDC controls manufacturer.
      b. Quantity: (1).
      c. Minimum RAM: 16 GB.
      d. Minimum Processing Speed: current generation Intel or AMD processor.
      e. Minimum Hard Drive Memory: 1 TB.
      f. Drives: (1).
      g. Ports: (3)-USB, (1)-HDMI.
      h. Display: 17" Monitor.
      i. Network Connection:
         1) Ethernet interface card.
      j. Operating System: Current version of Windows
      k. Manufacturers: Asus, Dell, Lenovo, MSI

2.04 CONTROLLERS

A. BUILDING CONTROLLERS
   1. General:

a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
c. Share data between networked controllers.
d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
e. Utilize real-time clock for scheduling.
f. Continuously check processor status and memory circuits for abnormal operation.
g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
h. Communication with other network devices to be based on assigned protocol.

2. Communication:
a. Controller to reside on a BACnet network using Ethernet or MS/TP protocol.
b. Perform routing when connected to a network of custom application and application specific controllers.
c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

3. Anticipated Environmental Ambient Conditions:
a. Outdoors and/or in Wet Ambient Conditions:
1) Mount within waterproof enclosures.
2) Rated for operation at 40 to 150 degrees F.
b. Conditioned Space:
1) Mount within dustproof enclosures.
2) Rated for operation at 32 to 120 degrees F.

4. Local Keypad and Display for each Controller:
a. Use for interrogating and editing data.
b. System security password prevents unauthorized use.

5. Provisions for Serviceability:
a. Diagnostic LEDs for power, communication, and processor.
b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.

6. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.

7. Power and Noise Immunity:
a. Maintain operation at 90 to 110 percent of nominal voltage rating.
b. Perform orderly shutdown below 80 percent of nominal voltage.
c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

B. CUSTOM APPLICATION CONTROLLERS

1. General:
a. Provide sufficient memory to support controller's operating system, database, and programming requirements.
b. Share data between networked, microprocessor based controllers.
c. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
d. Utilize real-time clock for scheduling.
e. Continuously check processor status and memory circuits for abnormal operation.
f. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
g. Communication with other network devices to be based on assigned protocol.

2. Communication:
a. Controller to reside on a BACnet network using Ethernet or MS/TP protocol.
b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

3. Anticipated Environmental Ambient Conditions:
    a. Outdoors and/or in Wet Ambient Conditions:
        1) Mount within waterproof enclosures.
        2) Rated for operation at 40 to 150 degrees F.
    b. Conditioned Space:
        1) Mount within dustproof enclosures.
        2) Rated for operation at 32 to 120 degrees F.
4. Local Keypad and Display for each Controller:
    a. Use for interrogating and editing data.
    b. System security password prevents unauthorized use.
5. Provisions for Serviceability:
    a. Diagnostic LED's for power, communication, and processor.
    b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
6. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
7. Power and Noise Immunity:
    a. Maintain operation at 90 to 110 percent of nominal voltage rating.
    b. Perform orderly shutdown below 80 percent of nominal voltage.
    c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

C. APPLICATION SPECIFIC CONTROLLERS
1. General:
    a. Not fully user programmable, microprocessor based controllers dedicated to control specific equipment.
    b. Customized for operation within the confines of equipment served.
    c. Communication with other network devices to be based on assigned protocol.
2. Communication:
    a. Controller to reside on a BACnet network using Ethernet or MS/TP protocol.
    b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:
    a. Outdoors and/or in Wet Ambient Conditions:
        1) Mount within waterproof enclosures.
        2) Rated for operation at 40 to 150 degrees F.
    b. Conditioned Space:
        1) Mount within dustproof enclosures.
        2) Rated for operation at 32 to 120 degrees F.
4. Local Keypad and Display for each Controller:
    a. Use for interrogating and editing data.
    b. System security password prevents unauthorized use.
5. Provisions for Serviceability:
    a. Diagnostic LEDs for power, communication, and processor.
    b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
6. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
7. Power and Noise Immunity:
    a. Maintain operation at 90 to 110 percent of nominal voltage rating.
    b. Perform orderly shutdown below 80 percent of nominal voltage.
    c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.

D. INPUT/OUTPUT INTERFACE
1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
2. All Input/Output Points:

a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.

3. Binary Inputs:
   a. Allow monitoring of On/Off signals from remote devices.
   b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
   c. Sense dry contact closure with power provided only by the controller.
4. Pulse Accumulation Input Objects: Conform to all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
   a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
   b. Compatible with and field configurable to commonly available sensing devices.
6. Binary Outputs:
   a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
   b. Outputs provided with three position (On/Off/Auto) override switches.
   c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
7. Analog Outputs:
   a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
   b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
   c. Drift to not exceed 0.4 percent of range per year.
8. System Object Capacity:
   a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
   b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.05 POWER SUPPLIES AND LINE FILTERING

A. Power Supplies:
1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
2. Limit connected loads to 80 percent of rated capacity.
3. Match DC power supply to current output and voltage requirements.
4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
7. Operational Ambient Conditions: 32 to 120 degrees F.
8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD 810 for shock and vibration.
9. Line voltage units UL recognized and CSA approved.

B. Power Line Filtering:
1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
2. Minimum surge protection attributes:
   a. Dielectric strength of 1000 volts minimum.
   b. Response time of 10 nanoseconds or less.

c. Transverse mode noise attenuation of 65 dB or greater.
d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.06 LOCAL AREA NETWORK (LAN)

A. Provide communication between control units over local area network (LAN).

B. LAN Capacity: Not less than 60 stations or nodes.

C. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.

D. LAN Data Speed: Minimum 19.2 Kb.

E. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.

F. Transmission Median: Fiber optic or single pair of solid 24 gage twisted, shielded copper cable.

G. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.07 SYSTEM SOFTWARE

A. Operating System:
1. Concurrent, multi-tasking capability.
a. Common Software Applications Supported: Microsoft Excel.
2. System Graphics:
a. Allow up to 10 graphic screens, simultaneously displayed for comparison and monitoring of system status.
b. Animation displayed by shifting image files based on object status.
c. Provide method for operator with password to perform the following:
1) Move between, change size, and change location of graphic displays.
2) Modify on-line.
3) Add, delete, or change dynamic objects consisting of:
(a) Analog and binary values.
(b) Dynamic text.
(c) Static text.
(d) Animation files.
3. Custom Graphics Generation Package:
a. Create, modify, and save graphic files and visio format graphics in PCX formats.
b. HTML graphics to support web browser compatible formats.
c. Capture or convert graphics from AutoCAD.
4. Standard HVAC Graphics Library:
a. HVAC Equipment:
1) Air Handlers.
2) Terminal HVAC Units.
b. Ancillary Equipment:
1) Fans.
2) Dampers.
3) Ductwork.
c. File Format Compatible with Graphics Generation Package Program.

B. Workstation System Applications:
1. Automatic System Database Save and Restore Functions:
a. Current database copy of each Building Controller is automatically stored on hard disk.
b. Automatic update occurs upon change in any system panel.
c. In the event of database loss in any system panel, the first workstation to detect the loss automatically restores the database for that panel unless disabled by the operator.

2. Manual System Database Save and Restore Functions by Operator with Password Clearance:
    a. Save database from any system panel.
    b. Clear a panel database.
    c. Initiate a download of a specified database to any system panel.
3. Software provided allows system configuration and future changes or additions by operators under proper password protection.
4. On-line Help:
    a. Context-sensitive system assists operator in operation and editing.
    b. Available for all applications.
    c. Relevant screen data provided for particular screen display.
    d. Additional help available via hypertext.
5. Security:
    a. Operator log-on requires user name and password to view, edit, add, or delete data.
    b. System security selectable for each operator.
    c. System supervisor sets passwords and security levels for all other operators.
    d. Operator passwords to restrict functions accessible to viewing and/or changing system applications, editor, and object.
    e. Automatic, operator log-off results from keyboard or mouse inactivity during user-adjustable, time period.
    f. All system security data stored in encrypted format.
6. System Diagnostics:
    a. Operations Automatically Monitored:
        1) Workstations.
        2) Printers.
        3) Modems.
        4) Network connections.
        5) Building management panels.
        6) Controllers.
    b. Device failure is annunciated to the operator.
7. Alarm Processing:
    a. All system objects are configurable to "alarm in" and "alarm out" of normal state.
    b. Configurable Objects:
        1) Alarm limits.
        2) Alarm limit differentials.
        3) States.
        4) Reactions for each object.
8. Alarm Messages:
    a. Descriptor: English language.
    b. Recognizable Features:
        1) Source.
        2) Location.
        3) Nature.
9. Configurable Alarm Reactions by Workstation and Time of Day:
    a. Logging.
    b. Printing.
    c. Starting programs.
    d. Displaying messages.
    e. Dialing out to remote locations.
    f. Paging.
    g. Providing audible annunciation.
    h. Displaying specific system graphics.
10. Custom Trend Logs:
    a. Definable for any data object in the system including interval, start time, and stop time.
    b. Trend Data:

1) Sampled and stored on the building controller panel.
2) Archivable on hard disk.
3) Retrievable for use in reports, spreadsheets and standard database programs.
4) Archival on LAN accessible storage media including hard disk, tape, Raid array drive, and virtual cloud environment.
5) Protected and encrypted format to prevent manipulation, or editing of historical data and event logs.

11. Alarm and Event Log:
    a. View all system alarms and change of states from any system location.
    b. Events listed chronologically.
    c. Operator with proper security acknowledges and clears alarms.
    d. Alarms not cleared by operator are archived to the workstation hard disk.
12. Object, Property Status and Control:
    a. Provide a method to view, edit if applicable, the status of any object and property in the system.
    b. Status Available by the Following Methods:
        1) Menu.
        2) Graphics.
        3) Custom Programs.
13. Reports and Logs:
    a. Reporting Package:
        1) Allows operator to select, modify, or create reports.
        2) Definable as to data content, format, interval, and date.
        3) Archivable to hard disk.
    b. Real-time logs available by type or status such as alarm, lockout, normal, etc.
    c. Stored on hard disk and readily accessible by standard software applications, including spreadsheets and word processing.
    d. Set to be printed on operator command or specific time(s).
14. Reports:
    a. Standard:
        1) Objects with current values.
        2) Current alarms not locked out.
        3) Disabled and overridden objects, points and SNVTs.
        4) Objects in manual or automatic alarm lockout.
        5) Objects in alarm lockout currently in alarm.
        6) Logs:
            (a) Alarm History.
            (b) System messages.
            (c) System events.
            (d) Trends.
    b. Custom:
        1) Daily.
        2) Weekly.
        3) Monthly.
        4) Annual.
        5) Time and date stamped.
        6) Title.
        7) Facility name.
    c. Tenant Override:
        1) Monthly report showing total, requested, after-hours HVAC and lighting services on a daily basis for each tenant.
        2) Annual report showing override usage on a monthly basis.
    d. Electrical, Fuel, and Weather:
        1) Electrical Meter(s):
            (a) Monthly showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.

(b) Annual summary showing monthly electrical consumption and peak demand with time and date stamp for each meter.

2) Fuel Meter(s):
   (a) Monthly showing daily natural gas consumption for each meter.
   (b) Annual summary showing monthly consumption for each meter.

3) Weather:
   (a) Monthly showing minimum, maximum, average outdoor air temperature and heating/cooling degree-days for the month.

C. Workstation Applications Editors:
   1. Provide editing software for each system application at PC workstation.
   2. Downloaded application is executed at controller panel.
   3. Full screen editor for each application allows operator to view and change:
      a. Configuration.
      b. Name.
      c. Control parameters.
      d. Set-points.
   4. Scheduling:
      a. Monthly calendar indicates schedules, holidays, and exceptions.
      b. Allows several related objects to be scheduled and copied to other objects or dates.
      c. Start and stop times adjustable from master schedule.
   5. Custom Application Programming:
      a. Create, modify, debug, edit, compile, and download custom application programming during operation and without disruption of all other system applications.
      b. Programming Features:
         1) English oriented language, based on BASIC, FORTRAN, C, or PASCAL syntax allowing for free form programming.
         2) Alternative language graphically based using appropriate function blocks suitable for all required functions and amenable to customizing or compounding.
         3) Insert, add, modify, and delete custom programming code that incorporates word processing features such as cut/paste and find/replace.
         4) Allows the development of independently, executing, program modules designed to enable and disable other modules.
         5) Debugging/simulation capability that displays intermediate values and/or results including syntax/execution error messages.
         6) Support for conditional statements (IF/THEN/ELSE/ELSE-F) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
         7) Support for floating-point arithmetic utilizing plus, minus, divide, times, square root operators; including absolute value; minimum/maximum value from a list of values for mathematical functions.
         8) Language consisting of resettable, predefined, variables representing time of day, day of the week, month of the year, date; and elapsed time in seconds, minutes, hours, and days where the variable values cab be used in IF/THEN comparisons, calculations, programming statement logic, etc.
         9) Language having predefined variables representing status and results of the system software enables, disables, and changes the set points of the controller software.

2.08 CONTROLLER SOFTWARE

A. All applications reside and operate in the system controllers and editing of all applications occurs at the operator workstation.

B. System Security:
   1. User access secured via user passwords and user names.
   2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.

3. User Log On/Log Off attempts are recorded.
4. Automatic Log Off occurs following the last keystroke after a user defined delay time.

C. Object or Object Group Scheduling:
   1. Weekly Schedules Based on Separate, Daily Schedules:
      a. Include start, stop, optimal stop, and night economizer.
      b. 10 events maximum per schedule.
      c. Start/stop times adjustable for each group object.
   2. Exception Schedules:
      a. Based on any day of the year.
      b. Defined up to one year in advance.
      c. Automatically discarded and replaced with standard schedule for that day of the week upon execution.
   3. Holiday or Special Schedules:
      a. Capability to define up to 99 schedules.
      b. Repeated annually.
      c. Length of each period is operator defined.

D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.

E. Alarms:
   1. Binary object is set to alarm based on the operator specified state.
   2. Analog object to have high/low alarm limits.
   3. All alarming is capable of being automatically and manually disabled.
   4. Alarm Reporting:
      a. Operator determines action to be taken for alarm event.
      b. Alarms to be routed to appropriate workstation.
      c. Reporting Options:
         1) Start programs.
         2) Print.
         3) Logged.
         4) Custom messaging.
         5) Graphical displays.
         6) Dial out to workstation receivers via system protocol.

F. Demand Limiting:
   1. Building power consumption monitored from signals generated by a current transformer, attached to the building feeder lines.
   2. Demand limit controlled via load shedding or load restoration in a predetermined and predictive manner.
   3. Demand Reduction Methods:
      a. Supply air temperature reset.
      b. Space temperature set-point reset.
      c. Equipment off/on prioritization.
   4. Relevant variables that influence demand limiting control are based on the power company methodology for computing demand charges.
   5. Operator On-Line Changes Allowed:
      a. Addition and deletion of loads controlled.
      b. Changes in demand intervals.
      c. Changes in demand limit for meter(s).
      d. Maximum equipment shutoff time.
      e. Minimum equipment shutoff time.
      f. Select rotational or sequential shedding and restoring.
      g. Shed/restore priority.
   6. Information and Reports available Hourly, Daily, and Monthly:
      a. Total electric consumption.
      b. Peak demand.
      c. Date and time of peak demand.
      d. Daily peak demand.

G. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

H. PID Control Characteristics:
   1. Direct or reverse action.
   2. Anti-windup.
   3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
   4. User selectable controlled variable, set-point, and PED gains.

I. Staggered Start Application:
   1. Prevents all controlled equipment from simultaneously restarting after power outage.
   2. Order of equipment startup is user selectable.

J. Energy Calculations:
   1. Accumulated instantaneous power or flow rates are converted to energy use data.
   2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.
   3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.

K. Anti-Short Cycling:
   1. All binary output objects protected from short-cycling.
   2. Allows minimum on-time and off-time to be selected.

L. On-Off Control with Differential:
   1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
   2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.

M. Run-Time Totalization:
   1. Totalize run-times for all binary input objects.
   2. Provides operator with capability to assign high run-time alarm.

2.09 HVAC CONTROL PROGRAMS

A. General:
   1. Support Inch-pounds and SI (metric) units of measurement.
   2. Identify each HVAC Control system.

B. Optimal Run Time:
   1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
   2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
   3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
   4. Use outside air temperature to determine early shut down with ventilation override.
   5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.
   6. Operator commands:
      a. Define term schedule.
      b. Add/delete fan status point.
      c. Add/delete outside air temperature point.
      d. Add/delete mass temperature point.
      e. Define heating/cooling parameters.
      f. Define mass sensor heating/cooling parameters.
      g. Lock/unlock program.
      h. Request optimal run time control summary.
      i. Request optimal run time mass temperature summary.
      j. Request HVAC point summary.
      k. Request HVAC saving profile summary.
   7. Control Summary:

a. HVAC Control system begin/end status.
b. Optimal run time lock/unlock control status.
c. Heating/cooling mode status.
d. Optimal run time schedule.
e. Start/Stop times.
f. Selected mass temperature point ID.
g. Optimal run time system normal start times.
h. Occupancy and vacancy times.
i. Optimal run time system heating/cooling mode parameters.

8. Mass temperature summary:
   a. Mass temperature point type and ID.
   b. Desired and current mass temperature values.
   c. Calculated warm-up/cool-down time for each mass temperature.
   d. Heating/cooling season limits.
   e. Break point temperature for cooling mode analysis.
9. HVAC point summary:
   a. Control system identifier and status.
   b. Point ID and status.
   c. Outside air temperature point ID and status.
   d. Mass temperature point ID and point.
   e. Calculated optimal start and stop times.
   f. Period start.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

3.02 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation.

C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.

D. Provide conduit and electrical wiring in accordance with Electrical Division. Electrical material and installation shall be in accordance with appropriate requirements of Electrical Division.

3.03 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

B. Provide service engineer to instruct Owner's representative in operation of systems plant and equipment for 3 day period.

C. Provide basic operator training for 2 persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 80 hours dedicated instructor time. Provide training on site.

3.04 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate complete and operating system to Owner.

3.05 MAINTENANCE

A. Provide service and maintenance of energy management and control systems for one years from Date of Substantial Completion.

B. Provide two complete inspections, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.

C. Provide complete service of systems, including call backs. Make minimum of 4 complete normal inspections of approximately 4 hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

END OF SECTION

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC - SECTION 15928

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

B. Manufacturer's Instructions: Provide for all manufactured components.

C. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

D. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
   1. Revise shop drawings to reflect actual installation and operating sequences.

E. Warranty: Submit manufacturer’s warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Thermostats and Other Exposed Sensors: One of each type.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience approved by manufacturer.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.03 WARRANTY

A. Correct defective Work within a one-year period after Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The HVAC controls system shall connect to the existing Trane Building Automation system at this school. Update all graphics at the front end to incorporate this project. All products and services associated with the Building Automation System shall be provided and installed by Trane.

2.02 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.03 PERFORMANCE REQUIREMENTS – 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.

B. ASME Compliance: Fabricate and label products to comply with ASME Boiler and Pressure Vessel Code where required by authorities having jurisdiction.

C. Ground Fault: Products shall not fail due to ground fault condition when suitably grounded.

D. Environmental Conditions:
   1. Provide electric actuators, with protective enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Electric actuators not available with integral enclosures, complying with requirements indicated, shall be housed in protective secondary enclosures.
      a. Hazardous Locations: Explosion-proof rating for condition.

2.04 DAMPERS

A. Performance Requirements:

1. Test in accordance with AMCA 500-D.
2. Selection Criteria:
    a. Dampers shall have stable operation throughout full range of operation, from design to minimum airflow over varying pressures and temperatures encountered.
    b. Two-position dampers shall be full size of duct or equipment connection unless otherwise indicated.

B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch.

C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gage, 0.0299 inch, attached to minimum 1/2-inch shafts with set screws.
    1. Unless otherwise indicated, use parallel blade configuration for two-position control, equipment isolation service, and when mixing two airstreams. For other applications, use opposed blade configuration.

D. Blade Seals: Synthetic elastomeric inflatable mechanically attached; field replaceable.

E. Jamb Seals: Spring stainless steel.

F. Shaft Bearings: Oil impregnated sintered bronze.

G. Linkage Bearings: Oil impregnated sintered bronze.

H. Leakage: Less than one percent based on approach velocity of 2000 ft/min and 4 inches wg.

I. Maximum Pressure Differential: 6 inches wg.

J. Temperature Limits: -40 to 200 degrees F.

K. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

L. Damper actuator shall be factory installed by damper manufacturer as integral part of damper assembly. Coordinate actuator location and mounting requirements with damper manufacturer.

M. Airflow Measurement:
    1. Where indicated, provide damper assembly with integral airflow monitoring.
    2. Zero- to 10-V dc or 4- to 20-mA scaled output signal for remote monitoring of actual airflow.
    3. Accuracy shall be within 5 percent of the actual flow rate between the range of minimum and design airflow. For applications with a large variation in range between the minimum and design airflow, configure the damper sections and flow measurement assembly as required to comply with the stated accuracy over the entire modulating range.
    4. Provide a straightening device as part of the flow measurement assembly to achieve the specified accuracy with configuration indicated.
    5. Suitable for operation in untreated and unfiltered air.
    6. Provide temperature and altitude compensation and correction to maintain accuracy over temperature range encountered at site altitude.
    7. Provide automatic zeroing feature.

N. Airflow Control:
    1. Where indicated, provide damper assembly with integral airflow measurement and control.
    2. A factory-furnished and -calibrated controller shall be programmed, in nonvolatile EPROM, with application-specific airflow set point and range.
    3. The controller and actuator shall communicate to control the desired airflow.
    4. The controller shall receive a zero- to 10-V dc input signal and report a zero- to 20-mA output signal that is proportional to the airflow.
    5. Airflow measurement and control range shall be suitable for operation between 150 to 2000 fpm.
    6. Ambient Operating Temperature Range: Minus 40 to plus 140 deg F.
    7. Ambient Operating Humidity Range: 5 to 95 percent relative humidity, non-condensing.

8. Provide unit with control transformer rated for not less than 85 VA. Provide transformer with primary and secondary protection and primary disconnecting means. Coordinate requirements with field power connection.
9. Provide screw terminals for interface to field wiring.
10. Factory mount electronics within a NEMA 250, Type 1 painted steel enclosure.

2.05 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
2. Provide one operator for maximum 36 sq ft damper section.
3. Actuators shall operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.
4. Actuators shall produce sufficient power and torque to close off against the maximum system pressures encountered. Actuators shall be sized to close off against the fan shutoff pressure as a minimum requirement.
5. The total damper area operated by an actuator shall not exceed 80 percent of manufacturer's maximum area rating.
6. Provide one actuator for each damper assembly where possible. Multiple actuators required to drive a single damper assembly shall operate in unison.
7. Avoid the use of excessively oversized actuators which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.
8. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.
9. Provide mounting hardware and linkages for connecting actuator to damper.
10. Select actuators to fail in desired position in the event of a power failure.

B. Electric and Electronic Actuators:
1. Type: Motor operated, with or without gears, electric and electronic.
2. Construction:
   a. Less Than 100 W: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed steel enclosures.
   b. 100 up to 400 W: Gears ground steel, oil immersed, shaft-hardened steel running in bronze, copper alloy, or ball bearings. Operator and gear trains shall be totally enclosed in dustproof cast-iron, cast-steel, or cast-aluminum housing.
   c. Greater Than 400 W: Totally enclosed reversible induction motors with auxiliary hand crank and permanently lubricated bearings.
3. Field Adjustment:
   a. Spring return actuators shall be easily switchable from fail open to fail closed in the field without replacement.
   b. Provide gear-type actuators with an external manual adjustment mechanism to allow manual positioning of the damper when the actuator is not powered.
4. Two-Position Actuators: Single direction, spring return or reversing type.
5. Modulating Actuators:
   a. Capable of stopping at all points across full range and starting in either direction from any point in range.
   b. Control Input Signal:
      1) Three Point, Tristate, or Floating Point: Clockwise and counterclockwise inputs. One input drives actuator to open position, and other input drives actuator to close position. No signal of either input remains in last position.
      2) Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation.
      3) Pulse Width Modulation (PWM): Actuator drives to a specified position according to a pulse duration (length) of signal from a dry-contact closure, triac sink or source controller.

4) Programmable Multi-Function:
(a) Control input, position feedback, and running time shall be factory or field programmable.
(b) Diagnostic feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
(c) Service data, including at a minimum, number of hours powered and number of hours in motion.

6. Fail-Safe:
a. Where indicated, provide actuator to fail to an end position.
b. Internal spring return mechanism to drive controlled device to an end position (open or close) on loss of power.
c. Batteries, capacitors, and other non-mechanical forms of fail-safe operation are acceptable only where uniquely indicated.
7. Integral Overload Protection:
a. Provide against overload throughout the entire operating range in both directions.
b. Electronic overload, digital rotation sensing circuitry, mechanical end switches, or magnetic clutches are acceptable methods of protection.
8. Damper Attachment:
a. Unless otherwise required for damper interface, provide actuator designed to be directly coupled to damper shaft without need for connecting linkages.
b. Attach actuator to damper drive shaft in a way that ensures maximum transfer of power and torque without slippage.
c. Bolt and set screw method of attachment is acceptable only if provided with at least two points of attachment.
9. Stroke Time:
a. Operate damper from fully closed to fully open within 60 seconds.
b. Move damper to failed position within 15 seconds.
c. Select operating speed to be compatible with equipment and system operation.
d. Actuators operating in smoke control systems comply with governing code and NFPA requirements.
10. Sound:
a. Spring Return: 62 dBA.
b. Non-Spring Return: 45 dBA.

2.06 HUMIDISTATS

A. Room Humidistats:
1. Wall mounted, proportioning type.
2. Mount on wall with top of device at 48" a.f.f.
3. Throttling range: Adjustable 2 percent relative humidity.
4. Operating range: 30 to 80 percent.
5. Maximum temperature: 110 degrees F.
6. Cover: Set point indication.

B. Limit Duct Humidistat:
1. Insertion, two position type.
2. Throttling range: Adjustable 2 percent relative humidity.
3. Operating range: 20 to 80 percent.
4. Maximum temperature: 150 degrees F.

2.07 INPUT/OUTPUT SENSORS

A. Temperature Sensors:
1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
4. Temperature sensing device must be compatible with project DDC controllers.
5. Performance Characteristics:

a. RTD:
    1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
    2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
    3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
    4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
    5) Range: Minus 40 degrees F through 220 degrees F minimum.
b. Thermistor:
    1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
    2) Range: Minus 25 degrees F through 122 degrees F minimum.
    3) Heat Dissipation Constant: 2.7 mW per degree C.
c. Temperature Transmitter:
    1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
    2) Output: 4 - 20 mA.
d. Sensing Range:
    1) Provide limited range sensors if required to sense the range expected for a respective point.
    2) Use RTD type sensors for extended ranges beyond minus 30 degrees F to 230 degrees F.
    3) Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.
e. Wire Resistance:
    1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
    2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
f. Room Sensors: Locking cover where indicated on plans.
g. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
h. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.
i. Ceiling and Recessed Mount Temperature Sensors: Ceiling-mounted sensor in a low-profile housing.
j. Room Security Sensors: Stainless steel cover plate with insulated back and security screws.
k. Room Temperature Sensors:
    1) Construct for wall box mounting.
    2) Mount on wall with top of device at 48" a.f.f.
    3) Provide high impact ABS plastic housing.
    4) Provide the following:
        (a) Setpoint reset slide switch with an adjustable temperature range.
        (b) Individual heating/cooling setpoint slide switches.
        (c) Momentary override request push button for activation of after-hours operation.
        (d) Analog thermometer.
l. Room Temperature Sensors with Integral Digital Display:
    1) Construct for wall box mounting.
    2) Mount on wall with top of device at 48" a.f.f.
    3) Provide high impact ABS plastic housing.
    4) Provide a four button keypad with the following capabilities:
        (a) Indication of space and outdoor temperatures.
        (b) Setpoint adjustment to accommodate room setpoint.
        (c) Display and control fan operation status.
        (d) Manual occupancy override and indication of occupancy status.
        (e) Controller mode status.
        (f) Password enabled setpoint and override modes.
m. Temperature Averaging Elements:
    1) Use on duct sensors for ductwork 10 sq ft or larger.

2) Use averaging elements where prone to stratification with sensor length 8 ft or 16 ft.
3) Provide for all mixed air and heating coil discharge sensors regardless of duct size.

n. Insertion Elements:
1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.
2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.

B. Humidity Sensors:
1. Input Power, Voltage Type: Class 2; 12-30 VDC/24 VAC, 15mA max.
2. Input Power, mA Type: Class 2; Loop powered 12-30 VDC only, 30 mA max.
3. Output Voltage type: 3-wire observed polarity.
4. Output mA type: 2-wire, not polarity sensitive (clipped and capped).
5. Humidity:
a. HS Element: Digitally profiled thin-film capacitive.
b. Accuracy 1 percent at 10 to 80 percent relative humidity at 77 degrees F, multi-point calibration, NIST traceable.
1) Plus/minus 1 percent at 20-40 percent RH in mA output mode; (multi-point calibration, NIST traceable).
c. Scaling: 0-100 percent RH.
6. Temperature Effect:
a. Duct Mounted: Plus/minus 0.18 percent per degree F.
b. Outdoor Mounted: 4-20mA version: (0.0013x%RHx(TdegreeC-25)).
7. Hysteresis: 1.5 percent typical.
8. Linearity: Included in accuracy specification.
9. Reset Rate: 24 hours.
10. Stability: Plus/minus 1 percent @ 68 degrees F annually, for two years.
11. Temperature Monitoring:
a. Temperature Transmitter Output: Digital, 4-20mA (clipped & capped) or 0-5V/0-10V output.
1) HO Transmitter Accuracy: Plus/minus 2.3 degrees F.
2) HD Transmitter Accuracy: Plus/minus 1.0 degree F.
12. Operating Environment:
a. Operating Humidity Range: 0 to 100 percent RH noncondensing.
b. Operating Temperature Range: Minus 40 degrees F to 122 degrees F.
13. Wall Mounted Sensor: Voltage type encased in a High impact ABS plastic housing.

C. Carbon Dioxide Sensors, Duct and Wall:
1. Air Temperature: Range of 32 to 122 degrees F.
2. Relative Humidity: Range of 0 to 95 percent (non-condensing).
3. Power Input: Class 2; 12 to 30VDC or 24VAC 50/60 Hz; 100mA max.
4. Calibration Characteristics:
a. Automatically compensating algorithm for sensor drift due to sensor degradation.
b. Maximum Drift: 2 percent.
c. User calibratable with a minimum calibration interval of 5 years.
5. Construction:
a. Sensor Chamber: Non-corrosive material for neutral effect on carbon dioxide sample.
b. Provide duct mounted sensors with duct probe designed to protect sensing element from dust accumulation and mechanical damage.
c. Housing: High impact plastic.
6. Optional Equipment
a. Temperature Sensor:
1) Solid state, integrated circuit; Accuracy: Plus/minus 1 degree F; Resolution: 0.2 degrees F; Output Range: 50 to 95 degrees F.

2.08 THERMOSTATS

A. Electric Room Thermostats:
   1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
   2. Service: Cooling and heating.
   3. Covers: Locking with set point adjustment, with thermometer.

B. Line Voltage Thermostats:
   1. Integral manual On/Off/Auto selector switch, single or two pole as required.
   2. Dead band: Maximum 2 degrees F.
   3. Cover: Locking with set point adjustment, with thermometer.
   4. Rating: Motor load.

C. Room Thermostat Accessories:
   1. Thermostat Covers: Brushed aluminum.
   2. Insulating Bases: For thermostats located on exterior walls.
   3. Mount on wall with top of device at 48" a.f.f.
   4. Thermostat Guards: Metal mounted on separate base.
   5. Adjusting Key: As required for device.
   6. Aspirating Boxes: Where indicated for thermostats requiring flush installation.

D. Outdoor Reset Thermostat:
   1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
   2. Scale range: -10 to 70 degrees F.

E. Immersion Thermostat:
   1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint and adjustable throttling range.

F. Airstream Thermostats:
   1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
   2. Averaging service remote bulb element: 7.5 feet.

G. Electric Low Limit Duct Thermostat:
   1. Snap acting, single pole, single throw, automatic reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below setpoint,
   2. Bulb length: Minimum 20 feet.
   3. Provide one thermostat for every 20 sq ft of coil surface.

H. Electric High Limit Duct Thermostat:
   1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or above setpoint,
   2. Bulb length: Minimum 20 feet.
   3. Provide one thermostat for every 20 sq ft of coil surface.

I. Fire Thermostats:
   1. Normally closed contacts, manual reset.

J. Heating/Cooling Valve Top Thermostats:
   1. Proportional acting for proportional flow, molded rubber diaphragm, remote bulb liquid filled element, direct and reverse acting at differential pressure to 25 psig, cast housing with position indicator and adjusting knob.

2.09 TIME CLOCKS

A. Seven day programming switch timer with synchronous timing motor and seven day dial, continuously charged Ni-cad battery driven power failure 8 hour carry over and multiple switch trippers to control systems for minimum of two and maximum of eight signals per day with two normally open and two normally closed output switches.

B. Solid state programmable time control with 24-hour battery carry over.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Ensure installation of components is complementary to installation of similar components.

G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Furnish and install products required to satisfy most stringent requirements indicated.

C. Install products level, plumb, parallel, and perpendicular with building construction.

D. Provide ceiling, floor, roof, and wall openings and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

E. Firestop penetrations made in fire-rated assemblies and seal penetrations made in acoustically rated assemblies.

F. Fastening Hardware:
   1. Stillson wrenches, pliers, and other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
   2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
   3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

G. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for Owner's access, confirm unrestricted ladder placement is possible under occupied condition.

H. Check and verify location of thermostats with plans and room details before installation. Locate top of thermostat 48 inches above floor.

I. Mount freeze protection thermostats using flanges and element holders.

J. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

K. Provide separable sockets for liquids and flanges for air bulb elements.

L. Provide thermostats in locking covers where indicated.

M. Provide guards on thermostats in entrances.

N. Provide valves with position indicators and with pilot positioners where sequenced with other controls.

O. Provide mixing dampers of opposed blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors. Provide separate minimum outside air damper section adjacent to return air dampers with separate damper motor.

P. Provide isolation (two position) dampers of parallel blade construction.

Q. Provide pilot positioners on pneumatic damper operators sequenced with other controls.

R. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.

3.03 CONTROL DAMPERS

A. Install smooth transitions, not exceeding 30 degrees, to dampers smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.

B. Clearance:
   1. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.
   2. Install dampers with at least 24 inches of clear space on sides of dampers requiring service access.

C. Service Access:
   1. Dampers and actuators shall be accessible for visual inspection and service.
   2. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator.

D. Install dampers straight and true, level in all planes, and square in all dimensions. Install supplementary structural steel reinforcement for large multiple-section dampers if factory support alone cannot handle loading.

E. Attach actuator(s) to damper drive shaft.

F. For duct-mounted and equipment-mounted dampers installed outside of equipment, install a visible and accessible indication of damper position from outside.

G. Checkout Procedures:
   1. Check installed products before continuity tests, leak tests, and calibration.
   2. Check dampers for proper location and accessibility.
   3. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material, and support.
   4. Verify that control dampers are installed correctly for flow direction.
   5. Verify that proper blade alignment, either parallel or opposed, has been provided.
   6. Verify that damper frame attachment is properly secured and sealed.
   7. Verify that damper actuator and linkage attachment are secure.
   8. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
   9. Verify that damper blade travel is unobstructed.

H. Adjustment, Calibration, and Testing:
   1. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.
   2. Stroke control dampers with pilot positioners. Adjust damper and positioner following manufacturer's recommended procedure, so damper is 100 percent closed, 50 percent closed, and 100 percent open at proper air pressure.
   3. Check and document open and close cycle times for applications with a cycle time of less than 30 seconds.
   4. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

3.04 TEMPERATURE INSTRUMENTS

A. Mounting Location:
   1. Roughing In:
      a. Outline instrument mounting locations before setting instruments and routing cable, wiring, tubing, and conduit to final location.
      b. Provide independent inspection to confirm that proposed mounting locations comply with requirements indicated and approved submittals.
         1) Indicate dimensioned locations with mounting height for all surface-mounted products on Shop Drawings.
         2) Do not begin installation without submittal approval of mounting location.
      c. Complete installation rough-in only after confirmation by independent inspection is complete and approval of location is documented for review by Owner and Architect on request.
   2. Install switches and transmitters for air and liquid temperature associated with individual air-handling units and associated connected ductwork and piping near air-handling units co-located in air-handling unit system control panel to provide service personnel a single and convenient location for inspection and service.

3. Install liquid and steam temperature switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
4. Install air temperature switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
5. Mount switches and transmitters on walls, floor-supported freestanding pipe stands, or floor-supported structural support frames. Use manufacturer's mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.

B. Special Mounting Requirements:
1. Protect products installed outdoors from solar radiation, building and wind effect with stand-offs and shields constructed of Type 316 stainless.
2. Temperature instruments having performance impacted by temperature of mounting substrate shall be isolated with an insulating barrier located between instrument and substrate to eliminate effect. Where instruments requiring insulation are located in finished space, conceal insulating barrier in a cover matching the instrument cover.

C. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static-pressure class and leakage and seal classes indicated using neoprene gaskets or grommets.

D. Space Temperature Sensor Installation:
1. Conceal assembly in an electrical box of sufficient size to house sensor and transmitter, if provided.
2. Install electrical box with a faceplate to match sensor cover if sensor cover does not completely cover electrical box.
3. In finished areas, recess electrical box within wall.
4. In unfinished areas, electrical box may be surface mounted if electrical light switches are surface mounted. Use a cast-aluminum electric box for surface-mounted installations.
5. Align electrical box with other electrical devices such as visual alarms and light switches located in the vicinity to provide a neat and well-thought-out arrangement. Where possible, align in both horizontal and vertical axis.

E. Outdoor Air Temperature Sensor Installation:
1. Mount sensor in a discrete location facing north.
2. Protect installed sensor from solar radiation and other influences that could impact performance.
3. If required to have a transmitter, mount transmitter remote from sensor in an accessible and serviceable location indoors.

F. Single-Point Duct Temperature Sensor Installation:
1. Install single-point-type, duct-mounted, supply- and return-air temperature sensors. Install sensors in ducts with sensitive portion of the element installed in center of duct cross section and located to sense near average temperature. Do not exceed 24 inches in sensor length.
2. Install return-air sensor in location that senses return-air temperature without influence from outdoor or mixed air.
3. Rigidly support sensor to duct and seal penetration airtight.
4. If required to have transmitter, mount transmitter remote from sensor at accessible and serviceable location.

G. Averaging Duct Temperature Sensor Installation:
1. Install averaging-type air temperature sensor for temperature sensors located within air-handling units, similar equipment, and large ducts with air tunnel cross-sectional area of 20 sq. ft. nd larger.
2. Install sensor length to maintain coverage over entire cross-sectional area. Install multiple sensors where required to maintain the minimum coverage.
3. Fasten and support sensor with manufacturer-furnished clips to keep sensor taut throughout entire length.

4. If required to have transmitter, mount transmitter in an accessible and serviceable location.

H. Low-Limit Air Temperature Switch Installation:
   1. Install multiple low-limit switches to maintain coverage over entire cross-sectional area of air tunnel.
   2. Fasten and support sensing element with manufacturer-furnished clips to keep element taut throughout entire length.
   3. Mount switches outside of airstream at a location and mounting height to provide easy access for switch set-point adjustment and manual reset.
   4. Install on entering side of cooling coil unless otherwise indicated on Drawings.

I. Liquid Temperature Sensor Installation:
   1. Assembly shall include sensor, thermowell[and connection head].
   2. For pipe NPS 4 and larger, install sensor and thermowell length to extend into pipe between 50 to 75 percent of pipe cross section.
   3. For pipe smaller than NPS 4:
      a. Install reducers to increase pipe size to NPS 4 at point of thermowell installation.
      b. For pipe sizes NPS 2-1/2 and NPS 3, thermowell and sensor may be installed at pipe elbow or tee to achieve manufacturer-recommended immersion depth in lieu of increasing pipe size.
      c. Minimum insertion depth shall be 2-1/2 inches.
   4. Install matching thermowell.
   5. Fill thermowell with heat-transfer fluid before inserting sensor.
   6. Tip of spring-loaded sensors shall contact inside of thermowell.
   7. For insulated piping, install thermowells with extension neck to extend beyond face of insulation.
   8. Install thermowell in top dead center of horizontal pipe positioned in an accessible location to allow for inspection and replacement. If top dead center location is not possible due to field constraints, install thermowell at location along top half of pipe.

J. Checkout Procedures:
   1. Check installed products before continuity tests, leak tests, and calibration.
   2. Check temperature instruments for proper location and accessibility.
   3. Verify sensing element type and proper material.
   4. Verify location and length.
   5. Verify that wiring is correct and secure.

K. Adjustment, Calibration, and Testing:
   1. Description:
      a. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
      b. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
      c. For each analog instrument, make a three-point test of calibration for both linearity and accuracy.
      d. Equipment and procedures used for calibration shall meet instrument manufacturer's written instructions.
      e. Provide diagnostic and test equipment for calibration and adjustment.
      f. Field instruments and equipment used to test and calibrate installed instruments shall have accuracy at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent shall be checked by an instrument with an accuracy of 0.5 percent.
      g. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
      h. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.
      i. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements and to supplement requirements indicated.

2. Analog Signals:
    a. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
    b. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
    c. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistance source.
    d. Digital Signals:
    e. Check digital signals using a jumper wire.
    f. Check digital signals using an ohmmeter to test for contact.
    g. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.
    h. Switches: Calibrate switches to make or break contact at set points indicated.
3. Transmitters:
    a. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
    b. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistance source.

3.05 MAINTENANCE

A. Provide service and maintenance of control system for one year from Date of Substantial Completion.

END OF SECTION

NEW GYMNASIUM ADDITION TO MONTEVALLO HIGH SCHOOL
(#25-33)

PROJECT NO. 25111

OCTOBER 2025

STEWART ENGINEERING, INC.
ELECTRICAL CONSULTANTS

PHONE (256) 237-0891 **ANNISTON, ALABAMA 36202**

10-23-2025

1.0 - GENERAL

1.1 Related Documents

The general provisions of the contract, including General Conditions and General Requirements, apply to the work specified in this section.

1.2 Description of Work

Furnish all labor and materials required to complete the electrical work indicated on drawings or herein specified. Major work included in this section shall be:

A. Arrange with local utility companies for providing such electrical and electronic services as indicated or herein specified. Pay to utility companies any charges associated with providing these services.

B. Remove or relocate all electrical or electronic services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the completed project or any code pertaining thereto.

C. Furnish and install complete electrical light and power system.

D. Connect all meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches and/or other equipment forming part of the system.

E. Connect all electrical equipment mentioned in this section or noted on drawings, whether furnished by Electrical Contractor or by others.

F. Procure and pay for permits and certificates as required by Local and State Ordinances and Fire Underwriters Certificate of Inspection.

G. Complete alterations and additions to existing Fire Alarm System.

H. Complete alterations and additions to existing Intercom Sound System.

I. Furnish and install complete Gymnasium Sound System.

J. Furnish and install outlet boxes, faceplates, conduit raceways, cable, data outlet faceplates and jacks, patch panels, IDF cabinets and termination connectors and all other equipment needed for complete Telephone and Computer Cabling System.

K. Visit the Site and determine conditions which affect this contract. Failure to do so will in no way relieve contractor of his responsibility under this contract.

L. Submit to Architect a Certificate of Final Inspection from local Inspection Department along with assurance of completion of any items on this list.

1.3 Qualifications Of Electrical Subcontractor

The Electrical Subcontractor shall meet the following qualifications:

A. In business as an Electrical Contractor for two (2) years prior to the date of opening bids. Employees of a General Contractor will not be acceptable for work for this Section.

B. Have completed at least five (5) projects with Electrical installations of character and scope comparable with this project. Contractor must supply list of projects, with the project shop drawings, for approval. If Contractor uses subcontractor for any portion of project, the name of this subcontractor must be submitted, along with similar project list, for approval.

C. If Electrical Subcontractor proposes to use any other Subcontractor for any part of the work, these Subcontractors shall also meet the above qualifications before bid is acceptable.

D. If Subcontractor's office is located more than 75 miles from jobsite, he shall submit the name of a service company with a 20 mile radius of the jobsite, for approval, who will be responsible through him for service required during the warranty period.

1.4 Drawings

A. Drawings indicate diagrammatically extent, general character and approximate location of work. Where work is indicated but with minor details omitted, furnish and install it complete so as to perform its intended function. For Building Details and Mechanical Equipment follow Architectural, Structural and Mechanical Drawings and fit electrical work thereto.

B. Take finish dimensions at Job in preference to scale dimension.

C. Except as above noted, make no changes in or deviations from work as shown or specified except on written order of Architect.

1.5 Manufacturers Drawings and Data

A. Within twenty (20) days after award of contract submit six (6) copies of Manufacturer's drawings to Architect for review of the following items. Partial submittals will be acceptable. Shop drawings of a specified item or system to be in one submittal:

1. Lighting Fixtures
2. Panelboards
3. Dry Type Transformers
3. Disconnect Switches
4. Intercom Sound System
5. Gymnasium Sound System
6. Fire Alarm System
7. Computer Cabling System
8. Occupancy Sensors and Lighting Control Panel
9. List of five (5) projects that Contractor (and any sub-contractor) has completed similar in size and capacity to this project

B. Drawings of power equipment to contain exact details of device placement, phasing and numbering in elevation form. They shall also contain elevation view of front panelboard/switchboard outside cover.

C. See Section 01350 – Administrative Requirements, for submittal procedures.

1.6 Progress of Work

A. Cooperate with other crafts and schedule work as needed. Do not delay other trades. Maintain necessary competent mechanics and supervision to provide an orderly progression of the work.

B. Be informed as to equipment furnished by other trades but not liable for added cost incurred by equipment substitutions made by others above wiring indicated on drawings.

1.7 Insurance

A. This Contractor to carry Workman's Compensation Insurance and Public Liability Insurance and save Owner free from damage from suits arising out of the performance of this contract.

1.8 Protection of Persons and Property During Construction

A. Take all precautions to provide safety and protection to persons and protection of materials and property as necessary, including protection from injury from rotating or moving equipment, tools, hot surfaces, holes, shafts, falling objects, electrical energy and all other potential hazards. Erect signs, barricades, warning lights, instruct workmen and others who may be subject to construction hazards.

B. Protect items of equipment from stains, corrosion, scratches and any other damage or dirt, whether in storage at job site or installed. No damaged or dirty equipment, lenses or reflectors will be accepted.

1.9 Service Entrance

A. Main service shall be as shown on drawings. Verify with the local utility company that the location, arrangement, voltage, phase and connections to utility service as well as required metering equipment are coordinated with and in accordance with requirements of the local utility company. If their requirements are at variance with these drawings or specifications, the contract price shall include any additional cost necessary to meet those requirements without extra cost to the Owner after contract is entered into. Notify Architect of any changes required before proceeding with work.

1.10 Cleaning Up

A. During the progress of the work keep the Owner's premises in a neat and orderly condition, free from accumulation of debris resulting from this work and at completion of the work, remove all material, scrap, etc., not a part of this contract.

1.11 Operating and Maintenance Instructions

A. Turn over to Architect one set of marked "as built" drawings, one set of all equipment catalogs and maintenance data and one set of shop drawings on all equipment requiring same. Explain and demonstrate electrical systems to Owner's representative.

1.12 Guarantee

A. Guarantee that all work executed under this section will be free from defects of workmanship and materials for a period of one year from date of final acceptance of this work. Promptly repair, replace or otherwise make good, any defect becoming apparent during this period, upon notification and at no charge to Owner.

B. See Section 01910 – Closeout Submittals, for additional warranty requirements.

1.13 Temporary Systems

A. The Electrical Contractor shall be responsible for the furnishing and installation of all equipment and materials necessary for providing temporary power required by all trades during construction. All temporary wiring shall be installed so as not to interfere with the new construction and shall be made in a safe and approved manner.

B. It shall be the responsibility of the Electrical Contractor to visit the site prior to submitting bid and thoroughly review all existing conditions affecting the temporary system requirements.

2.0 PRODUCTS

2.1 Standard of Materials

A. All materials shall be new and listed by the Underwriters' Laboratories as conforming to these standards.

B. Material substitutions will be considered only when evidence of equality and suitability, satisfactory to the Architect, has been presented in writing, with samples, if requested by the Architect. All proposed substitutions shall be approved in writing at least five days prior to bid date.

C. It shall be understood that the Architect has the authority and may reject any material or equipment not specified or approved, or showing defects of manufacturer or workmanship, before or after installation.

2.2 Conduits

A. Rigid: To be mild steel piping, galvanized inside and outside, and conform to ASA Specification C80.180.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburg.

B. Intermediate Metal Conduit: Shall be hot dipped galvanized inside and outside, and manufactured in accordance with U.L. Standard #6 or #1242. By Allied or approved equal.

C. E.M.T.: To be of high grade steel electro-galvanized outside and lacquer or enamel coating inside and conform to ASA Specification C80.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburg.

D. PVC: To be of high impact PVC Schedule 40 and conform to Underwriters' Laboratories Standard UL-651. PVC to be used only where indicated on drawings. By Pittsburg, R. G. Sloane or Carlon.

2.3 Couplings and Connectors

A. Rigid & IMC: By Raco, Efcor, Republic or Appleton.

B. E.M.T.: All steel raintight type. Pressure indented type or cast metal will not be approved. All connectors to be insulated. By Appleton, Raco or Efcor.

C. PVC: To be of high impact PVC Schedule 40. Joints to be made with PVC solvent cement as recommended by manufacturer. By Pittsburg, R.G. Sloane or Carlon.

2.4 Bushings

A. All rigid bushings 1 1/4" and larger shall be the insulated grounding type. All other bushings shall be OZ. Mfg. Co., Type B or Efcor Type 55 insulated metallic type or by Sylvania.

2.5 Conduit Seals

A. All conduit seals for wall, floor or ceiling penetrations shall be by 3M Company or approved equal.

2.6 Conduit Accessories

A. Conduit clamps and supports by Efcor, Steel City or G. A. Tinnerman. Conduit fittings by Pyle-National, Crouse-Hinds and Appleton.

2.7 Building Wire

A. Conductors shall have current carrying capacities as per N.E.C. and with 600 volt insulation THW #12 minimum. Conductors #3 and smaller to be copper. Conductors #2 and larger to be copper unless specifically indicated aluminum on drawings. Insulation for conductors to be N.E.C. Type THW for #3 and smaller. Insulation for conductors #2 and larger shown in cable specifications. By Phelps-Dodge, Rome, Simplex, General Cable, Okonite or Anaconda.

2.8 Cable

A. Conductors for 0-600 volts shall have copper, current carrying capacities as per N.E.C. with cross-linked polyethylene insulation and thickness to IPCEA standards, and U.L. Standard #44. Rated for wet and dry locations. Type THW or THWN. By Phelps-Dodge, Rome, Simplex, General Cable, Okonite or Anaconda.

2.9 Fixture Wire

A. Conductors for fixtures of 300 watts or less shall be #16 type TFN, for fixtures of more than 300 watts #14 type TFN shall be used. Conductors in channel of fluorescent fixtures shall be type THHN or RHH. Conductors shall be either Phelps-Dodge, Anaconda, Rome or General Cable.

2.10 Control and Signal System Wire

A. Type TFF minimum size #16 copper and fully color coded. Conductors by Phelps-Dodge, Anaconda, Rome or General Cable.

2.11 Junction Boxes (thru 4-11/16")

A. Sheet Metal: To be standard type with knockouts made of hot dipped galvanized steel by Steel City, Raco, Appleton or approved equal.

B. Cast: To be type FS, FD, JB, GS or SEH as required for application.

C. Junction and Pull Boxes (larger than 4-11/16"): To be cast aluminum for all below grade exterior use and where shown all other shall be oil tight, JIC boxes not less than 16 gauge. Hoffman type "CH" Boxes.

2.12 Gutters

A. Up to and including 8" x 8" shall be a standard manufacturer's item as manufactured by Square D, ITE or B & C Company. Special gutters shall be made of code grade galvanized sheet steel with hinged covers having approved fastening devices. At each location shown for gutters, install a wood backboard not less than 3/4" thick, paint 2 coats of gray enamel, mount all equipment thereon. Conductors serving a gutter shall be extended without reduction in size for the entire length of the gutter. Tap-offs to the switches and other items serviced by the gutter shall be made with Penn-Union and Anderson compression connectors for aluminum conductors. Properly tape and insulate.

2.13 Outlet Boxes

A. Standard type with knockouts made of hot dipped galvanized steel. Ceiling outlet boxes shall be 4" octagon 1-1/2" deep or larger if required due to number of wires.

B. Boxes shall be provided with approved 3/8" fixture studs where required. Except when located in exposed concrete block switch and receptacles boxes shall be 4" square for single gang installation. Appropriate gang boxes shall be used for mounting ganged switches. Use Raco square block boxes for exposed block walls. By Steel City, Raco, National or Appleton.

2.14 Safety Switches

A. Furnish and install safety switches as indicated on the drawings. Switch to be NEMA Heavy Duty type HD and Underwriters' Laboratories listed. Safety switches to be G.E., Cutler Hammer, Sylvania or Square D Heavy Duty type.

B. Appropriately identify each safety switch by engraving micarta name plate.

2.15 Fuses

A. Branch feeder fuses to be Bussman Manufacturing Company dual element and fusetron. Main switch fuses to be Bussman Manufacturing Company dual Hi-Cap. Fuses to be used only where indicated on drawings. Equals by Littel Fuse accepted.

2.16 Manual Motor Switches

A. Thermal overload protection to be provided for single phase motors by manual switches with overload units rated as required by specific motor to be served. Manufactured by Cutler Hammer or Square D with NEMA Type 1 enclosure.

2.17 Wiring Devices

A. Switches shall be A.C. type as made by Hubbell, P & S, Sierra, Bryant, Slater or Arrow Hart as shown on the drawings.

B. Receptacles shall be Hubbell, Bryant, P & S, Sierra, Slater or Arrow Hart as shown on the drawings.

C. Wiring devices shall be gray with stainless steel plates, beige with brass, ivory with ivory bakelite, brown and brown bakelite.

2.18 Special Purpose Receptacles

A. Special purpose receptacles (other than 120V, 20A) shall be complete with a matching cord grip cap of the same manufacturer. See plans for special receptacles required in various locations.

2.19 Floor Outlets

A. Floor outlets shall be an adjustable, galvanized floor box finished with accessories as required for a complete installation for power or communications. Except as identified otherwise on the plans, use Type "A" outlets as follows:

1. Type "A" Outlet: Power outlets shall be Hubbell #2429 floor box finished with #S-2425 brass plate, #SC-3091 service fitting, receptacle and required accessories. Signal outlets shall be the same except #SC-3090 service fitting.

2. Type "B" Outlet: Power outlets shall be Hubbell #2429 floor box finished with #S-3825 brass plate and complete with duplex receptacle and required accessories. Signal outlets shall be the same, less receptacle and with #S-2425 plate and #S-3086 nozzle furnished to the Owner.

3. Type "C" Outlet: Power outlets shall be Hubbell #B-2529 floor box furnished with #S-3042 carpet flange and #S-3040 service fitting with duplex receptacle. Signal outlets shall be the same, except with #S-3041 service fitting.

B. Where equipment is to be connected above floor level, delete service fitting and nipple or flex to connection from threaded brass floor plate.

2.20 Finishes

A. All electrical items (device and telephone plates, junction, floor outlets, under-floor duct junctions, outlets, and other miscellaneous items) to match finish of building hardware in area installed. Unfinished areas with exposed conduit, shall have surface mounted boxes, gray switches and outlets, galvanized metal plates with beveled edges. All outlets to be gray with stainless steel plates.

2.21 Fixtures

A. Fixtures shall be furnished as shown in fixture schedule on drawings. It shall be specifically the responsibility of this Contractor to verify exact type ceiling and recessing depth of all recessed fixtures, prior to any purchasing of fixtures. Stems shall be approved ball aligner type swivel 30 degrees from vertical and swivel below canopy. Paint stems same color as fixture trim. Stems in unfinished areas to be unpainted conduit.

2.22 Guarantee And Warranty - Lamps

A. The guarantee and warranty shall apply to lamps as follows:

1. LED Fixtures: Per manufacturer’s warranty period for LED driver.

B. Guarantees shall begin from date of final acceptance.

2.23 Lighting Panelboards

A. Furnish and install circuit breaker panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be of dead front construction equipped with thermal-magnetic molded case circuit breakers of frame size and trip ratings as shown on the schedule.

B. Circuit breakers shall be Square D type EDB (bolt-on) thermal-magnetic, molded case circuit breakers. Breakers shall be 1,2 or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multipole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. In addition, trip indication shall include a VISI-TRIP indicator appearing in the window of the breaker case.

C. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated with continuous current ratings as noted on the plans. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.

D. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall only bolt-on circuit breakers. All current carrying parts of the bus structure shall be plated.

E. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboard locks shall be keyed alike. Fronts shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. Each front shall be furnished with a "hinged trim" accessory. 600A panelboard fronts shall have exposed trim clamps. Column width fronts shall be provided on the inside of the door.

F. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously be connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying the specified panelboard short circuit current or greater. Testing of panelboard overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

G. Panelboards shall be listed by Underwriters Laboratories and shall bear the UL label. When required, panelboards shall be suitable for use as service equipment. Panelboards shall be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).

2.24 Receptacle Panelboards

A. Furnish and install circuit breaker lighting panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be equipped with thermal-magnetic molded case circuit breakers with frame and trip ratings as shown on the schedule.

B. Circuit breakers shall be Square D type QOB (bolt-on) thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3-pole with an integral crossbar to assure simultaneous opening of all poles in multipole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. In addition, trip indication shall include a VISI-TRIP indicator appearing in the window of the breaker case. Bolt-on (NQOB) circuit breakers shall be able to be installed in the panelboard without requiring additional mounting hardware. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 240 volts ac maximum with continuous current ratings as noted on the plans. Interrupting ratings shall be 65,000 rms symmetrical amperes maximum at 240 volts ac maximum. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.

C. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall accept bolt-on (NQOB) circuit breakers. All current carrying parts of the bus structure shall be plated.

D. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboard locks shall be keyed alike. Fronts shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. Each front shall be furnished with a "hinged trim" accessory. Column width fronts shall have exposed hinges and be screw cover type. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door.

E. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying specified panelboard short circuit current or greater. Testing of panelboard overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

F. Panelboards shall be listed by Underwriters Laboratories and bear the UL label. When required, panelboards shall be suitable for use as service equipment. Panelboards shall be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).

2.25 Distribution And Power Panels

A. Furnish and install distribution and power panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be deadfront, safety type equipped with thermal-magnetic, molded case circuit breakers with trip ratings as indicated on the schedule.

B. Panelboard bus structure and main lugs or main breaker shall have current rating as indicated on the panelboard schedule. Ratings to be established by heat rise tests conducted according to UL Standard UL67.

C. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Permanent circuit identification to be on each breaker. Tripped indication shall be clearly shown by breaker handle taking a position between ON and OFF. Provisions for additional breakers shall be such that no additional connectors will be required to add breakers.

D. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standards. The size of wiring gutters to be in accordance with UL Standards. Cabinets to be equipped with spring latch and tumbler-lock on door trim. Doors over 48" long shall be equipped with three point latch and vault lock. All locks to be keyed alike. End walls shall be removable. Front locks shall be code gauge, full finished steel with rust-inhibiting primer and baked enamel finish. Each front shall be furnished with a "hinged trim" accessory. A circuit directory frame and card with clear plastic covering shall be provided on the inside of the door. The directory shall be typed to identify the load fed by each circuit. Furnish an engraved micarta plate on front of panel with panel name and rating.

E. The panelboard interior assembly to be deadfront with panelboard front removed. Main lugs or main breaker shall be barriered on five sides. The barrier in front of the main lugs to be hinged to fixed part of the interior. The end of the bus structure opposite the mains shall be barriered.

F. Panelboards to be listed by Underwriters' Laboratory and bear UL label. When required, panelboards to be suitable for use as Service Equipment. Panelboards to be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).

G. When utilized as Service Entrance Equipment, this panelboard shall be equipped with built-in surge protection.

2.26 Dry Type Transformers

A. The transformers shall be manufactured, tested and rated in accordance with ANSI C89.1-1961 and NEMA STI-4-1961 Standards, and these specifications.

B. The transformers shall be two winding, dry-type, air-cooled, 60Hz with indoor enclosures, except as otherwise noted on the drawings.

C. The minimum KVA rating shall be as shown on the drawings and shall be equipped with standard full capacity high voltage taps, 2-2-1/2% above and 4-2-1/2% below normal high voltage.

D. Overload capacities shall be:

160% - 2 hour
140% - 1 hour
125% - 2 hours
110% - 4 hours
105% - 8 hours

E. The transformers shall have core material of non-aging, high permeability, grain oriented, cold reduced silicon steel.

F. The transformers shall be 480 Volt, 3 Phase, 3 Wire to 120/208 volts, 3 Phase, 4 Wire grounded secondary neutral.

G. The maximum continuous full rated load temperature rise shall be 150 degrees C.

H. The transformers shall successfully withstand the maximum short circuit current at rated top voltage, in conformance with NEMA Standards: STI-4 and ANSI C.89.1.

I. The maximum percent voltage regulation at unity power factor load shall be 2%.

J. Noise levels shall conform to NEMA Standards: STI-4 and ANSI C.89.1.

K. Maximum impedance at 75 degrees C. shall be 3%.

L. Minimum load efficiency shall be 97%.

M. A floor mounted transformer enclosure and supports shall make no contact with wall surfaces.

N. All conduit directly connected to transformer enclosures shall be flexible steel conduit, and shall extend for a minimum of one foot from transformer enclosures, measured along the conduit center lines.

O. Manufacturers shall be Square D, General Electric, or Eaton (Cutler Hammer).

2.27 Fire Alarm System

A. General

1. The contractor shall complete additions and alterations to existing low voltage, automatic and manual addressable fire alarm system, as specified herein and indicated on the drawings. The system shall include a central control panel, power supply, signal initiating devices, annunciator, remote station equipment, audible and visual alarm devices, provisions for connections to municipal fire circuits, a conduit and wiring system, all necessary devices required to provide a complete operating system.

2. The system shall comply with the applicable provisions of the current National Fire Protection Association Standard Number 72, and meet all requirements of the local authorities having jurisdiction. All equipment and devices shall be listed by the Underwriters' Laboratories, Incorporated or approved by the Factory Mutual Laboratories.

3. To establish the type and quality of system desired, the equipment specified is that of Notifier Company. No deviation will be considered unless submittals are received and approved, in writing, not less than ten (10) days prior to bid date. Simplex and Edwards are approved equals.

B. Control Panel

1. The Contractor shall provide and install all necessary expansion cards to the existing Notifier Addressable Control Panel.

C. Power Supply

1. Shall be 24 volt D.C., filtered and regulated, and shall provide sufficient power for all system functions.

2. The fire alarm system main power supply shall operate from 120 volt A.C. This connection shall be made in conduit or cable in accordance with local and national codes. Separate over-current protection shall be provided, marked "FIRE ALARM".

3. The 120 volt A.C. main power shall be converted to low-voltage direct current for system operation. The system shall operate on 24 volts D.C. with trickle charged batteries provided as an emergency source of supply for operating the system in the event of the interruption of main power. A changeover relay in the Control Panel shall transfer to standby power automatically upon main power failure and automatically reconnect to main power upon restoration.

D. Fire Alarm Pull Stations

Shall be Notifier Type LNG-1 flush mounted with MMX-101 monitor module. Stations with two sets of contacts will not be acceptable.

E. Smoke Detectors

Notifier Model SDX-551 photoelectric smoke detector, dual chamber design shall be installed where shown on plans.

Type DHX-501 Duct Housing with SDX-551 photoelectric detector, sampling tubes and CMX-2 shutdown relay shall be installed in air-handling system duct work where shown on plans. Optional feature for actuation of contact closure for fan shut-down and/or damper closure on alarm shall be provided in Control Panel. Remote indicator shall be Notifier RA-400.

Contractor shall wire System such that if the System goes into alarm (any zone), all HVAC units will be shut down.

F. Heat Detectors

Model FDX-551 heat detectors, combination fixed temperature and rate of rise, 135 degree F or 190 degree F (Model HD-604 with MMX-101), shall be installed where shown on the plans.

G. Signaling Devices

Notifier Model SHG24-1575WR Combination Horn-Strobe unit shall be installed where shown on plans. Notifier Model GXS-4-1575WR Strobe Unit shall be installed where shown on plans. Notifier Model SPK4-24-1575 combination Speaker-Stobe shall be installed where indicated on the plan. All Horn-Strobe units shall meet ADA requirements. Make separate connections to horns and to strobes to permit strobes to operate after system is silenced.

H. Remote Station Receiving Panel

1. Terminals and other necessary facilities shall be provided in the Control Panel to permit automatic transmission of trouble and alarm signals over leased or private owned telephone cable to a Remote Station Receiving Panel located in the fire, police, or other continuously manned facility, so designated for response to fire emergency.
2. Receiving equipment compatible with existing system, if applicable, shall be installed under this contract. Install Notifier 911A Digital Communicator.

3. The contractor shall coordinate requirements with telephone company and cognizant municipal fire officials to assure a complete operating system performing all functions specified and shall so attest by written certification to the architect prior to acceptance of building for occupancy.

I. Wiring

1. All wiring shall be in accordance with the NATIONAL ELECTRICAL CODE and the local code having jurisdiction. Unless otherwise specified, minimum wire size shall be 12 gauge for A.C. and power supply connections, 14 gauge for audible alarm and auxiliary circuits, and 14 gauge for signal initiating circuits. Typical diagrams shall be provide for devices and power wiring.

2. Wiring shall be run in conduit. In general the wiring shall consist of:

From the Control Panel.

a. West Penn No. 995 shielded twisted pair common to all Fire Alarm Stations or Detectors.

b. 4#14 wires common to each circuit of Fire Alarm Signals.

J. Certified Fire Alarm Contractor

1. The Certified Fire Alarm Act requires that the company installing the fire alarm system must be licensed as a Certified Fire Alarm Contractor. The contractor must have a NICET Level III Technician in a position of responsibility, and the license must be issued in the name of the certificate holder and the contractor. The Certified Fire Alarm Act also requires that technicians working for the Certified Contractor must hold a current NICET Level II, or equivalent, certification. Contractors wishing to bid this project will be required to show evidence at the pre-bid conference that he/she meets the certification requirements of the Certified Fire Alarm Act and holds a permit/license issued by the State Fire Marshall.

K. Testing, Guarantee And Service

1. A Factory trained representative of the manufacturer shall supervise final testing of the system and it shall be subject to the approval and acceptance of the responsible engineer. On completion of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system. The Owner shall be provided with a written verification of this inspection and certification.
2. The Fire Alarm system shall be free from defects in workmanship and materials, under normal use and service, for a period of one year from date of acceptance or beneficial occupancy; whichever earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.

3. The equipment manufacturer shall be represented by a service organization, and the name of this organization shall be furnished to the Architect and Owner. The service organization shall furnish, gratis to the Owner, a one year maintenance and inspection Contract, effective from the date of final acceptance. The contract shall provide for four inspections during the contract year.

2.28 Intercom Sound System

A. General

The contractor shall complete alterations and additions to the existing Sound System as specified herein as shown on the plans together with all equipment and accessories required to provide a complete operating System. The System shall be installed by a factory trained sound system contractor for the equipment manufacturer.

The entire System shall be guaranteed for a period of one (1) year from the date of final acceptance of the installation and any defective equipment or parts shall be replaced or repaired, during the guarantee period, at no cost to the Owner.

The manufacturer and model numbers are provided to establish quality of equipment and operating requirements for the system. Any proposed substitution of equipment must be approved by the Architect within ten days prior to bid date. No substitution will be permitted after the project bid date.

B. Console

The existing Control Console is a Carehawk 1000 System.

C. Ceiling Speakers

a. Furnish speakers in classrooms, common areas, etc. as indicated on drawings.

b. Ceiling speaker assembly shall consist of Atlas SD72 speaker, Atlas CS95-8 enclosure, Atlas 62-8 baffle, and Atlas 180-2 supports.

c. Horn speakers shall be Atlas AP15T.

D. Call-In Switch

a. The INTERCOM SYSTEM shall allow for the use of normally open, normally closed, wireless and virtual call buttons. INTERCOM SYSTEMS not capable of using all the above call button types shall not be considered.

b. The INTERCOM SYSTEM shall allow for the use of virtual call buttons installed on local PC computers. INTERCOM SYSTEMS that do not support virtual call buttons shall not be considered.

c. Call buttons shall be Dukane D-CS25.

E. Wall Clocks

a. Dukane 2” clocks will be model 24ZB20 with 110-1674 recessed back box

b. Dukane 4” clocks will be model 24ZB40 with 110-3902 recessed back box

c. Dukane 12” analog clocks will be model 24AB12R with two gang back box

d. Double face analog clock housings will be 24SBDCF12R

e. Dukane clock power supply is model 110-3693 and requires 145-184-SC back box with 110-2191-SC door.

F. Sound System Existing

The Sound System is existing and this contractor shall make additions as called for on the drawings and specifications. Speakers and Call-in Switches added shall be compatible with the existing system. If the addition over loads the existing amplifier then this contractor shall expand the system or replace it to accommodate the existing plus additions.

G. Sound System Installation

1. All wiring shall be in accordance with the local national codes.

2. Wiring shall be run in conduit except where accessible above lay-in ceilings. The wiring shall consist of the following:

a. West Penn 357 cable from amplifier to speakers.

2.29 Gymnasium Sound System

A. General

1. Project Information

a. Abbreviations - Definitions:
1) (AVC) – Audio Video Contractor
2) (EC) – Electrical Contractor
3) (GC) – General Contractor

b. Provisions:
1) Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.
2) It is understood and agreed by the Audio-Video Contractor (AVC), that the work herein described shall be complete in every detail to supply, install and integrate a totally functional AV system per these specifications.
3) It is hereby understood and agreed that verbal only communication is not sufficient. Emails and hard paper documents, faxes, mail, transmittals, etc. will be utilized for project communication of any type.
4) The AV Consultant or Owner reserves the right to substitute new products which become available provided that:
a) The (AVC) has not yet purchased the specified equipment.
b) The substitute equipment shall not increase the (AVC) cost.
5) Requests for AV specification or drawing clarification shall be made, in writing or via email, not later than (10) days prior to the bid date.
6) All materials and equipment shall be fully insured against loss or damage up until final acceptance of the system by the Owner or until Owner relieves the Contractor in writing of this responsibility.

c. Typical Audio-Video Contractor (AVC) Scope & Requirements:
1) At a minimum, the Audio-Video Contractor (AVC) shall be responsible for the following system scope requirements and the installation/integration there of:
a) Engineering, Verification of Site Working Conditions, Dimensions, etc.
b) Electronic (AVC) PDF Submittals & PDF (AVC) System Shop Drawings.
c) New (AVC) Equipment & Low Voltage Cable, (Per Specifications).
d) Complete Installation of all (AVC) Equipment and Low Voltage Cable.
e) Complete Integration and Programming of all (AVC) Equipment & Control Devices.
f) (AVC) Cable and Device Labeling, (Per Specifications).
g) Coordination as required with other appropriate Contractors or Trades.

h) Power Sequencing via Low Voltage Control, Remote Controls, etc.
i) Field Confirmation & Coordination of Complete LV Conduit System.
j) Scheduling and Sequencing with the General and Electrical Contractor.
k) 7:1 Safety Rigging/Overhead Suspension, Structural Stamped Drawing.
l) Audio Network, Dante, AES50, Network Switches, Fiber, Programming.
m) Installation of Speaker Suspension Beam Clamps, Uni-Strut, Nuts, Bolts, etc.
n) Custom Steel Brackets, Welding, etc.
o) Rental Equipment as Required.
p) Highly Experienced Specialized Manpower and Site Supervision.
q) Fire Alarm Interrupt/Shut Down (AVC) System Interface.
r) Daily Cleanup of Boxes, Packing Materials, Surplus Debris Discard.
s) Site Safety Directives and Jobsite Meetings.
t) Testing, Inspection, Alignment, and Final Adjustments.
u) Demonstration - (32 Hrs.) Training, Video and Operational Instructions.
v) As-Built Drawings and Closeout Documents.
w) (1) Year Equipment and Labor Warranty Commencing on the Date of First Use.

d. Code & Regulation Requirements:
1) All equipment shall be UL and or CE listed and shall comply with the National Electrical Code or equivalent authority. All applicable regulations of serving utilities and governmental bodies having jurisdiction shall also apply.
2) All required Federal, State, County, City license and permits shall be provided as required by law.

2. Bid Proposal - Price

a. Instructions to Bidders:
1) Carefully examine the contract documents and the construction site (if applicable) to obtain first-hand knowledge of any existing conditions. The (AVC) will not be given extra payments for conditions which can be determined by examining documents or site and will not be relieved of any obligations with respect to bid.

2) By submitting a bid, the proposing (AVC) indicates that he has studied the contract documents, the (AVC) equipment list and specifications, and is in agreement that the specified system is a functional and fully operable system for the owner. It is the responsibility of the (AVC) to supply systems in full working order and furnish all minor equipment or any items needed for a complete system even if not specifically mentioned in these specifications or in the associated drawings without claim for additional payment. Notify the owner of any discrepancies in part numbers or quantities before bid. Failing to provide such notification, supply items and quantities according to the intent of the specification and drawings, without claim for additional payment.

3) Submit a Bid Proposal - Price to the appropriate designated contractor for this section of work, including all equipment as specified, complete installation and integration labor, applicable taxes, fees, licenses, shipping charges, freight, rental equipment, engineering, programming of any kind, per diem, travel expenses, bonding, special needs, work by others to be included in the bid price, etc.

3. Substitutions

a. Procedure:

1) To obtain prior pre-approval for substitutions of items listed, submit written requests at least 10 days before the bid date. Requests received after this time will not be considered. Requests shall clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. In some cases, a physical demonstration may be required for surety. Be advised that the consultant has specified products which he feels best represents the quality level of the (AVC) system desired by the owner. This is not an effort to sole source any particular product line, but is a simple effort to guarantee specific functionality and desired operational performance from a professional quality (AVC) system.
2) Reasonable product comparisons and functionality research should be utilized in choosing this alternative for pre-approval submission.
3) Verify with manufacturers availability and cost of all equipment proposed, including equipment specified herein. No cost increases will be allowed for manufacturers' cost increases, or for substitutions required because of unavailability of proposed equipment.

4. Contractor Experience

a. Qualifications:

1) The (AVC) or a project staff member shall be a specialist in the field of Audio Video Control System installations for a minimum period of 5 years.
2) The (AVC) installation team office shall be located a maximum of 150 miles from the project site.
3) The (AVC) shall have been an authorized dealer or representative of the major manufacturers listed in this specification.
4) The right is reserved by the Owner, Architect, Electrical Engineer, or Consultant to inspect previous equipment or systems as furnished or installed by the proposing (AVC). In addition, the right is reserved to reject a (AVC) who has failed in any respect to comply with the provisions of previous contracts.

5) The Owner, Architect, Electrical Engineer, or Consultant shall be the final judge of suitability of experience.

5. Work by Others

a. Work Statement:

1) Electrical Contractor to supply & install all applicable power conduit, low voltage conduit, AC power, screw cover back boxes – recessed or flush mounted, ceiling back boxes of any kind, speaker back-cans furnished by the (AVC) standard back boxes, pull strings, cable tray, etc.

2) The Electrical Contractor shall supply and install any required fire alarm interrupt relay or interface as required.
3) The Electrical Contractor shall install all AV floor boxes, AV wall boxes, furnished by the (AVC).
4) The General Contractor to provide and install all applicable structural steel support, welding or special attachment, modifications for speaker suspension beyond typical speaker rigging, etc.
5) The Owner shall supply and install all necessary IP Network Cables & Connectivity to all AVC Systems that require internet access.
6) The Owner shall provide any UL or ETL required listings, stickers, labels, site visits by UL or ETL Licensing agents, fees of any kind, etc. regarding the AVC Equipment in this scope of work - as required.

6. Coordination Items with Others:

a. Assistive Information Requirements:
1) The (AVC) shall assist the Owner, Architect, General Contractor, or Electrical Contractor in “finalizing device locations”, dimensions, speaker locations, floor and wall box locations, projection screen locations, projector locations, etc.
2) The (AVC) shall assist the Owner, Architect, General Contractor or Cabinetry Contractor in “finalizing device locations”, dimensions, in the control booth regarding countertop device placement, countertop height, under counter rack installation, etc.
3) The (AVC) shall submit Shop Drawings with dimensioned details as required for any of the above items per Section 1.7 below if requested.

7. Miscellaneous Requirements

a. Jobsite:
1) Safety Meeting Attendance as required.
2) Construction Meeting Attendance as required.
3) Project Gantt, Microsoft Project, Schedule or other Timeline Charts as required to the General Contractor, Electrical Contractor, etc.
4) All other jobsite provisions as required or stated in the general provisions of the contract.

b. Communication Regarding Any Potential (AVC) Project Issue:
1) Photographs with Dates, email narratives, etc. of potential problem construction areas, issues, or concerns shall be submitted to the immediate supervising project manager via email or RFI.

8. Submittals

a. Data:
1) One (1) PDF File including Data and Specification Sheets on All (AVC) Equipment with the following information:
a) Title Page - (AVC) Company Logo, Date, Project Name, Description, Address, Phone Number, Email Address.
b) Architect Name, Address, Phone Number, Project Manager Name, Phone Number, Email Address.
c) Electrical Engineer Company Name, Address, Phone Number, Project Manager Name, Phone Number, Email Address.
d) (AVC) Company Name, Address, Phone Number, Project Manager Name, Phone Number, Email Address.

e) 1st Page – Itemized Equipment List with Quantities, Model Number and Manufacturer Description.
f) Consecutive Pages – Specification Sheets (highlighted with yellow marker to note pertinent information, colors, model numbers, etc).

2) One (1) PDF File of Proposed AVC System Schematic Single Line Drawings including with the following Minimum Information and Utilizing the Equipment List to follow below:
a) Title Page with Table of Contents
b) Legend - Connectivity Page
c) Floor Plan Pages – Device Locations
d) Reflected Ceiling Plan Pages – Device Locations
e) Single Line Drawings – Audio
f) Single Line Drawings – Video
g) Single Line Drawings – Control with Touchscreen Function Narrative
h) Custom Plates/Panels – Detail Each to Scale – Consecutive Number
i) Floor and Wall Box Details
j) Speakers and Rigging Details
k) Projection Screen Elevations, Dimensions and Rigging Details
l) Projector Throw Distances to Screens
m) Misc. Mounting and Other Custom Details (As Required)
n) TV Elevations and Custom Details
o) Rack Elevations, Control Booth Elevations with Stated Devices

A. (AVC) Products

1. (AVC) System Equipment List

a. General:
1) Major Quantities of (AVC) equipment are indicated in the specifications to follow. Include any and all ancillary (AVC) equipment & parts not stated in this specification to provide the owner with complete installed (AVC) systems.
2) Refer to auxiliary electrical drawings for (AVC) device locations and approximate quantity information.

b. Base Bid Equipment List with Major Quantities:

Qty.	Model #	Location/Manufacturer/Description
		MAIN GYMNASIUM SOUND SYSTEM
3	PC-412D	YAMAHA POWER AMPLIFIER
12	CZR12	YAMAHA 12" SPEAKER
12	UB-DZR12H	YAMAHA 12" HORIZONTAL BRACKETS
12	CUSTOM	SPEAKON CABLES
2	DXS18	YAMAHA 18" POWERED SUBWOOFERS
2	SPW-1	YAMAHA CASTER KIT
2	AT8314-15	AUDIO TECHNICA XLR CABLE 15FT.
12	AS REQUIRED	SUSPENSION HARDWARE/UNISTRUT/AIRCRAFT CABLE/ETC.
2	DBR12	YAMAHA POWERED WEDGES
2	AT8314-25	AUDIO TECHNICA XLR CABLE 15FT.

2	P024-025	TRIPP LITE POWER CORD
1	TF RACK	YAMAHA DIGITAL MIXING CONSOLE
1	RD-L-2U	AURAY 2RU LOCKABLE DRAWER (2 HANDHELD WIRELESS)
1	CD-400U	TASCAM CD/MEDIA PLAYER
1	RS1215-20	TRIPPLITE POWER STRIP
1	AS REQUIRED	HARDWARE/CABLE/ETC.
1	RC5 RM	JUICE GOOSE KEYSWITCH (@ RK2)
2	CQ PD1-4	JUICE GOOSE POWER SEQ. UNIT (@ RK2)
1	RC-DM3	JUICE GOOSE FA INTERFACE (@ RK2)
1	SLXD24D/B58-H55	SHURE DUAL HH WIRELESS SYSTEM
1	DFIN	RF VENUE REMOTE ANTENNA
1	WM1	SENNHEISER WALL MOUNT
1	LW-100P-02	LISTEN IP HEARING IMPAIRED SYSTEM
1	EA6350	LINKSYS ROUTER (@ WAP1)
1	RD-L-3U	AURAY 3RU LOCKABLE DRAWER (IPAD)
1	MUQW2LL/A	APPLE IPAD MINI
1	UAG-IPDM4-BLK-VP	URBAN ARMOR CASE
1	DWR-35-22	MIDDLE ATLANTIC WALL RACK
2	FL-500P-BLK-C	FSR INSERT COVER
2	FL-500P-6-B	FSR BACKBOX
1	WB-X3NK-GNG w/WB-X3-CVR-WHT	FSR WALL BOX & COVER
3	DB-CIJ3	RDL INPUT INTERFACE (1 @ WB3, 1 @ FB1, 1 @ FB2)
4	DB-XLR2F	RDL DUAL XLR INPUTS (2 @ WB3, 1 @ FB1, 1 @ FB2)
3	DB-XLR3M	RDL DUAL XLR OUTPUTS (1 @ WB3, 1 @ FB1, 1 @ FB2)
3	AS REQUIRED	CUSTOM WALL COVER PLATES WITH CUTOUTS
2	DMS10E	ATLAS SOUND STAND
4	SM58S	SHURE MICROPHONES
6	PRO T-T	ULTIMATE SUPPORT BOOM STANDS
1	PROD2	RADIAL DIRECT BOX
1	PROAV2	RADIAL AV DIRECT BOX
7	AT8314-30	AUDIO TECHNICA 30' XLR CABLES
2	CMM-105	HOSA 1/8" MINI STEREO TO 1/8" MINI STEREO CABLE
2	CMR210	HOSA MINI TRS TO RCA MALE CABLE
AS REQ.	(10)454	WEST PENN WIRE (MIC/LINE)
AS REQ.	4246FBK1000	WEST PENN WIRE (CAT6 SHIELDED)
AS REQ.	248BK1000	WEST PENN 4 COND. 12 GA. SPEAKER CABLE
AS REQ.	810	WEST PENN RF COAX
1	AS REQUIRED	HARDWARE/CONNECTORS/RACK PANELS, SHELVES/MISC.

B. Installation

1. Execution

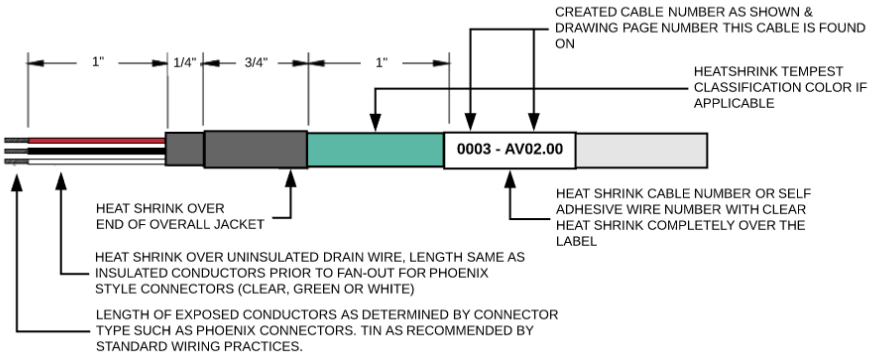
a. Project Worksite Staffing:

1) The job must be adequately staffed at all times. Unless circumstances beyond the control of the (AVC) occur, the same on-site individual shall be in charge throughout.

b. Wire and Cable Installation:
   1) All (AVC) wire and cable pulls of any kind shall be continuous - without splices - unless a designated termination point is shown on the design drawings.
   2) All (AVC) wire and cable shall be segregated as follows in their respective conduit systems:
      a) Mic Level (less than -20 dBm)
      b) Line Level, Intercom (-20dBm to +30 dBm)
      c) Video Level, Control, Fiber
      d) Speaker Level (more than +30 dBm)
   3) Do not pull (AVC) wire or cable through any box fitting or enclosure where change of raceway alignment or direction occurs. Do not bend conductors to less than recommended radius. Employ temporary guides, sheaves, rollers and other necessary items to protect cables from excess installation.
   4) Provide (AVC) wire pulling lubricants and pulling tensions strictly in accordance with the wire and cable manufacturers' recommendations.
   5) Each (AVC) cable that breaks out from a harness for termination to a device shall be provided with an ample service loop. Provide ample service loops at all other terminations so that plates, panels and equipment can be de-mounted for service and inspection.
   6) Neatly comb and lace all (AVC) cabling utilizing appropriate “Black” cable ties. All cable ties shall be trimmed with a cable tie gun and free from burrs or sharp edges.
   7) Separate (AVC) wiring of differing classifications by at least four (4) inches wherever possible. Wherever lines of differing classification must come closer together than four (4) inches, cross them perpendicular to each other.
   8) Use only Balanced (AVC) Signal Circuits throughout the entire (AVC) system. It is permissible to utilized unbalanced circuits for certain systems or locations with Hi-Fi CD Players, DVD Players, etc. Refer to design drawings.
   9) Under No Circumstances shall the “shield” from any (AVC) wire or cable be cut off and discarded. It shall be dressed, terminated, and secured as required.
   10) Every device with low voltage wiring interconnect shall be installed with regard for proper polarity. Absolute polarity shall be maintained through the entire system.

c. (AVC) Wire and Cable Dressing – Labeling:
   1) Label all permanently installed (AVC) wires on both ends with accepted Permanent Heat-Shrink labels, Panduit labels, (either direct hot-stamped or permanently printed heat-shrink labels or self-adhesive wire numbers).

2) (AVC) Wire and Cable Labeling Scheme as Follows:



d. Equipment Labeling:
   1) Custom receptacles, plates and panels shall be engraved per drawings using 1/8" engraved lettering filled with contrasting paint unless otherwise specified.
   2) Label all portable equipment with engraved block letters using initials and/or text. Label all portable cables similarly with printed heat-shrinkable tags located 12 inches from the male connector end.
   3) Provide self-adhesive dots to all normally user-adjustable front-panel controls to indicate their nominal settings. Controls on mainframe modules shall be marked on the appropriate internal labels.

e. Connections:
   1) Make connections using 60/40 Rosin-Core solder or accepted mechanical connectors. Utilize a temperature-controlled soldering station where possible.
   2) Soldering workmanship standards NASA-STD-8739.3 and NASA-STD-8739.4 are recommended references for proper soldering and cable termination, see http://nepp.nasa.gov/.
   3) For coaxial or D type pin connectors, use crimping tools, which are specifically designed for the application. The presence of non-accepted crimping tools in the Contractor's shop or on the job-site shall constitute prima-facie evidence of improper crimp-type connections, and may result in all crimp-type connections being redone.
   4) Use insulated spade lugs or fork terminals on all screw terminals. The following manufacturers are acceptable. See design drawings for additional direction.
      a) Amp
      b) Hubbell
      c) Molex
      d) IDEC
      e) Entrelec
      f) Wago

   5) Acceptable Manufacturers for Interconnect Cables and Connectors (where applicable):
      a) Switchcraft AAA Series, R Series, EH Series, HPC Series, E Series, etc.

b) Neutrik X Series, XX Series, DL Series, SPX Series, FC Series, STX Series, NL Series, C Series, PX Series, Powercon, etc.
c) Whirlwind
d) Canare
e) Kings
f) ADC
g) Ramlatch
h) Gepco
i) Extron
j) Crestron
k) West Penn
l) Bittree
m) Amphenol
n) Conxall
o) LEX
p) Hubbell
q) Rapco/Horizon
r) ProCo
s) Comprehensive
t) Audio Technica
u) HOSA

6) All Connectors shall have “silver or nickel” pins or sockets as a minimum level of quality. Specific details are provided on all (AVC) wall plates and panels, etc.
7) All 70V type speaker connections shall utilize WAGO Lever Nuts for splicing connections as required.

f. Equipment Racks:

1) When possible, pre-assemble and test all racks before delivery to the job site.
2) Provide adequate ventilation in racks to maintain in-rack temperatures of less than 100 degrees F. If required, provide accepted ventilation fans.
3) Provide and install sized appropriately Middle Atlantic or Raxxess Rear Rack Rails for each rack.
4) Use Middle Atlantic EB Series or Raxxess EFG flanged blank panels where applicable for unused spaces.
5) Use Middle Atlantic EVT or Raxxess EVP slotted vent panels where applicable for unused spaces.
6) Use Middle Atlantic HP or Raxxess PTSW rack screws.
7) Provide distribution of electrical power within the A/V equipment rack as shown on drawings and/or stated on the equipment list.
8) Use rubber grommets around cut-outs and knock-outs where conduit or chase nipples are not installed.
9) Supply and install any brackets, braces, velcro or misc. supports where necessary.
10) Utilize rear rack rail “L-Shape Slotted Lacing Bars” where applicable for crossing cabling and combing.
11) Provide Rear Rack Back Planes to electrical contractors at rough-in when Middle Atlantic SR Series Racks are utilized.
12) Bond to the building grounding system with #4 cu green stranded cable. Provide internal rack ground bus.
13) Provide appropriately sized Middle Atlantic or Raxxess rack mounted shelves as required for misc. device mounting in the front or rear of the rack.

g. Overhead Rigging:
1) All overhead rigging shall be performed by qualified and insured personnel.
2) Overhead suspension systems shall conform to a 7:1 Safety Ratio.
3) All overhead rigging shall use qualified “drop forged” graded materials.
4) All shackle pins and turnbuckles shall be “moused”.
5) All nuts shall be of a locking type. No jam nuts are to be used.
6) Thimbles shall be used on all wire rope eyes.
7) Suspended items shall have a “Gripple” safety cable as a means of secondary support and shall be considered an emergency fail secure device.
8) Crosby Products is the preferred rigging product line.

D. Training, System Demonstration & Event Attendance

1. Requirements

a. Attendance:
1) Provide a Sign-In Sheet of all Owner Provided Attendees to the (AVC) System Training and System Demonstration. Include Date, Phone Numbers, Emails, Department Locations and Names.

b. Training Time Required:
1) (32 Hours) - Specifically Addressing the Following Items Below with Training and System Demonstration.

c. Locations and Points of Direction:
1) Control Booth:
a) Power Sequencing and Control.
b) XLR Patch Panel Cross Connecting.
c) Digital Mixer Fader Level Control, Muting, Creating Mute Groups, Creating and Recalling Presets, Naming Presets, USB Flash Drive Storage, External Drive Recording, Input Gain and Output Gain Stages and Structure, Auxiliaries, Sub-Woofer Level Control, General Mixing Operation, Effects, etc.
d) Media Playback and Record Devices.
e) (NOM) Number of Open Microphones Gain Structure Control.
f) Wireless Microphone Operation and Battery Support.
g) Lose Gear Inventory.
h) Misc. Cables and Connections.
i) iPad, iPhone, or Other Media Playback Device Interfacing.
j) iPad Mix Control App.
k) Power Sequencing.

d. Operational Burn-In and Owner Demonstration:
1) Provide media source playback material as desired of different music genre.
2) Demonstrate system functionality and points of capability.

e. Recommended Software and Reading Material to the Owner (If Desired) at an Additional Cost:
1) Stage Plot Pro Software
2) Yamaha Sound Reinforcement Handbook
3) Studio Six Digital “Audio Tools” APP

E. Warranty / Service

1. Support

a. Warranty:

1) The (AVC) shall supply the owner with a (1) Year Installation Warranty from the written date of substantial completion or system first use by the owner; whichever comes first. These items shall be provided in the form of a “Signed Warranty Certificate” and included as a PDF on the project close out documentation.
2) The (AVC) equipment warranty from each (AVC) manufacturer shall be in effect for each full respective term from the factory.
3) In the event that an equipment failure takes place after the 1-year installation warranty has expired (but yet the manufacturer equipment warranty is still in effect), the owner shall pay the (AVC) their typical service rate to remove, pickup and return the failed device to the manufacturer for repair and then back again.
4) In the event the owner has purchased a 2nd year installation warranty service agreement, disregard item #3 above.
5) Provide a (6) month and (1) year general checkup on the system. Schedule as required.

b. Emergency Service:

1) Contractor shall provide emergency service and support 24 hours a day, 7 days a week. This service is intended as emergency response to failures or problems that require immediate help from a qualified systems technician. This emergency service must include a return call from a qualified systems technician within 2 hours. This emergency service must also provide an on-site visit from a qualified systems technician within 12 hours of the initial phone call, should it be deemed necessary by both parties to resolve the service issue. This emergency service and support shall be made available throughout the warranty period at no additional charge to the owner.

F. Project Close-Out

1. Procedure

a. Punch List:

1) The (AVC) shall confirm that any and all punch list items have been addressed and completed with the Awarding Contractor and/or Electrical Engineer.
2) The (AVC) shall provide the following Close Out Documents in PDF form to the Awarding Contractor via USB Flash Drive:
   a) Title Page - (AVC) Company Logo, Date, Project Name, Description, Address, Phone Number, Email Address.
   b) Architect Name, Address, Phone Number, Project Manager Name, Phone Number, Email Address.
   c) Electrical Engineer Company Name, Address, Phone Number, Project Manager Name, Phone Number, Email Address.
   d) (AVC) Company Name, Address, Phone Number, Project Manager Name, Phone Number, Email Address.
   e) Provide a letter to the Awarding Contractor stating that the system is 100% Installed, Punch List Completed and Fully Operational as Specified.

f) Itemized Equipment List with Quantities, Model Number and Manufacturer Description.
g) Itemized Inventory of Loose (AVC) Equipment Signed by the Owner's Representative.
h) Reviewed Testing Documents by the Electrical Engineer.
i) PDF File of Scrubbed and Corrected - Autocad Single Line As-Built Drawings, Lucid Chart As-Built Single Line Drawings, or Intaglio As-Built Single Line Drawings COMPLETE WITH WIRE NUMBERS PER ABOVE SECTION 3.1/C/2.
j) State on the drawings in the form of a 45 Degree Semi Transparent Water Mark – "AS-BUILT & DATE".
k) Signed Warranty Certificate which shall start on the written date of substantial completion or (AVC) system first use by the owner and run for a period of 1 Year Excluding Lamps, Bulbs, Owner Abuse or Acts of God.

3) (1) USB Flash Drive of Final Audio DSP Settings.
4) (1) USB Flash Drive of all Native Control System Programming Files.
5) (1) USB Flash Drive of PDF Owner Manuals & PDF Final As-Built Docs.
6) Provide Year #2 Installation Service Agreement Proposal.

2.30 Data Cabling System

A. General

1. All fiber optic and level 6 cable, data outlet faceplates and jacks, patch panels, MDF frame and IDF cabinets are to be provided by the owner and installed by the contractor. All other hardware including outlet boxes, conduit, cable support hardware, etc. as required to complete the installation described in these specifications shall be supplied and installed by this contractor.

2. All terminations are to be made by the contractor.

3. To be qualified to bid on this project, the contractor shall have successfully completed a minimum of five (5) projects for installation of fiber optic cable and a minimum of ten (10) projects for installation of Category 6 unshielded twisted pair cable.

B. Data Cabling System

1. The cabling system shall allow the owner to transmit up to speeds of 1,000 Mbs plus.

2. One 6-strand fiber optic cable shall be routed from the Main Distribution Frame (MDF) to each Intermediate Distribution Frame (IDF) and terminated on each end (all 6 strands).

3. Category 6 cable shall be routed from each IDF to the outlets and terminated on each end. Two (2) Category 6 cables shall also be routed from the MDF to each IDF and terminated on each end.

C. Data Outlet and Cabling System (Category 6 UTP)

1. Cable Installation

a. All cables shall be independently supported throughout the entire project by J-hooks installed on 4'-0" centers.

b. Cables shall be routed in groups of similar types. (i.e. data outlet cables grouped together, fiber optic cables grouped together, etc.).

c. Cables shall be routed in accordance with EIA TIA 568A standard.

d. The BICSI Methods Manual is to also be used as a guide for cable installations.

e. Horizontal cabling routed above ceilings shall be supported using the following methods.

(1) Cables supported on J-hooks designed specifically for this purpose. Support J-hooks from structure with threaded rod. Hang J-hooks approximately two feet above the lay-in ceiling.

(2) Cables independently supported using cabling clips attached to the ceiling structure or slab.

f. All cable shall be neatly routed above the lay-in ceiling along one side of the corridor. Branch out across the corridors as necessary to serve the classrooms and offices. Cabling shall be routed in a manner which will allow the owner to maintain access to the cables, electrical systems and HVAC equipment above the ceiling. Maintainability of all systems above the ceiling is critical.

g. All cables shall be bundled and tie wrapped together. Tie wrapping shall occur on four foot intervals throughout the space. Tie wraps should not bite into the cable, but should form loosely around the cables as not to depress the cable.

h. Cables above the corridor ceiling shall be supported using wall mounted J-hooks equal to Caddy CAT32 with any necessary attachment hardware.

i. Cables shall be routed into conduits stubbed up above the ceiling from each outlet (bushing on end of conduit). Cabling shall be routed in conduit above non-accessible ceilings.

j. All cables being pulled shall not exceed the manufacturers recommendations for pulling tensions.

k. All cables shall not exceed the manufacturers recommendations for minimum bending radius upon pulling and completed installation.

l. All cables shall pass acceptable test requirements and levels as detailed in Section 2.35(F) of these specifications. Contractor to remedy any cabling problems or defects in order to pass or comply with testing. This includes terminations and the re-pull on new cable (purchased from Owner by Contractor) as required at no additional cost to the owner, if it is determined that the cable was damaged during installation.

m. Cables shall not be spliced.

n. Ends of cables shall be terminated by the contractor on both ends unless otherwise noted.

o. Do not damage the outside jacket sheath of any cable.

p. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable laying on floor. Bundle and tie wrap up off of the floor.

q. Provide labeling for all cables.

r. Provide 12" wide ladder style tray with 1-" side rails and 9" rung spacing in the MDF and IDF rooms.

s. Contractor shall insure that cabling is a minimum of 5" away from all light fixtures.

t. Contractor shall install three (3) 1" sleeves with bushings in walls for routing cables to classrooms and offices. Install sleeves above the ceiling, directly above the door to the classroom or office. Install two (2) 4" sleeves with bushings for each IDF and MDF. Firestop all firewall penetrations.

u. When cables turn down below ceiling at each IDF and MDF, contractor shall install sleeves through the lay-in ceiling (bushing on each end). Cutting a hole in the ceiling tile is not acceptable.

v. Install a J-hook directly above the drop to every outlet. Bundle and tie wrap up 5' of slack cable prior to entering the wall.

2. Cable Terminations

a. Terminations shall be made in accordance with EIA TIA 568B standard.

b. Terminations shall be RJ45 type.

c. Route individual four pair category 6 cable to the backside of each patch panel and punch down onto a port. Label each port on the front and rear of each panel.

d. Maintain twists of each pair to the punch down point. Do not strip more than one-half inch of insulation from the cable at termination points.

3. Outlets

a. Install outlets per manufacturer’s instructions and recommendations.

b. Install and terminate all UTP cabling at each outlet as per manufacturer's instructions and recommendations.

c. Provide an outlet label on each cover plate and inside each wall box.

d. Leave at least 12" of slack cable at each outlet.

D. Fiber Optic Cabling System

1. Cable Installation

a. Fiber optic cable shall be installed inside buildings using the same methods as twisted pair; however, the following guidelines should be observed:

(1) Do not exceed maximum pulling tension.

(2) Do not exceed minimum installed and long term bend radius.

(3) Avoid sharp bends and corners.

(4) Provide additional crush/mechanical protection in high risk environments.

(5) Do not exceed maximum vertical rise specification unless intermediate tension relief is used.

(6) Observe all governing building and fire codes (either by using a properly listed cable or suitable raceway).

(7) Do not deform the cable jacket, specifically when using cable fasteners or ties.

(8) All fiber optic cabling shall be routed in innerduct. Innerduct shall be orange and shall be 2" diameter equal to Endot Industries #1050. Install an extra pull string in all innerduct.

b. When installing fiber optic cable in vertical runs, the following special guidelines should be observed:

(1) Work from the top down, when possible.

(2) Install intermediate split wire mesh grip(s) wherever the maximum vertical rise is exceeded.

(3) Secure the cable in the riser wiring closets with cable ties or straps as needed to prevent accidental damage to cable.

c. When installing fiber optic cable, the following guidelines should be observed at termination and splice points:

(1) The amount of cable slack at termination points should allow the cable to be routed to the termination location with enough additional cable to reach a convenient location for the polishing, plus an additional ten feet.

(2) Fiber optic warning signs should be placed on all innerduct and conduits containing fiber optic cable. Warning signs can help prevent damage resulting from the cable being mistaken for something else. Install signs at each end of the cable and every 20 feet in between.

d. When pulling fiber optic cable, the following guidelines should be observed:

(1) Yellow pulling compound should be used if making long or difficult pulls to reduce cable drag.

(2) When pulling fiber optic cable by any mechanical device (winch etc.) A dynameter must be used to ensure the maximum tensile strength is not exceeded.

(3) The mechanical pulling device will be equipped with clutches or shear pins to ensure this.

(4) The fiber cable will be attached to the pull line via the strength member or mesh grip.

e. Provide labeling of each cable indicating 'TO' and 'FROM' information.

f. Bring fiber optic cables into patch panels or cabinets at one location. Innerduct around cables shall extend to patch panel or cabinet entrance. Secure cables inside patch panel or cabinet at entrance point by tying the fiber jacket and/or strength members. Break out individual fiber cables inside of panel or cabinet. Coil up approximately 6 feet of spare cable before applying SC connector.

g. Cable Terminations

(1) Terminations shall be SC type and shall be installed per the manufacturer's instructions.

(2) Terminate the fiber optic cable onto the backside of the fiber optic patch panel using SC connectors.

(3) An SC connector shall be installed on each individual strand of fiber optic cable.

E. Labeling

1. General

a. All labels shall be vinyl.

b. All labels shall have an adhesive backing for permanent attachment.

c. All labels shall be of sufficient size. Minimum size shall be 1□" W x 3/16" H for outlets, outlet cables and patch panels.

2. Installation

a. Install labels straight.

b. Install labels every 50' along cable, at locations previously specified and as follows:

(1) Outlet faceplates.

(2) Inside of outlet box.

(3) Outlet cable inside box.

(4) Outlet cable in ceiling above outlet.

(5) Outlet cable at rear of patch panel.

(6) Fiber optic cable at patch panels.

3. Text Size and Information

a. Text shall be as large and bold as possible.

b. All outlets and outlet cables shall contain the outlet number, room number, IDF number and patch panel number.

F. System Testing and Certification

1. General

a. The following cabling systems shall be tested after installation is fully completed.

(1) Data outlet cabling from each outlet to the patch panel port, including patch cables.

(2) Fiber optic cabling from each IDF to the MDF. All six strands shall be tested.

b. Testing shall follow EIA TIA 568, TSB 36 and TSB 40 standards. All testing shall be done by an independent party not affiliated with Contractor who installed the system. Supply Owner with copy of test results.

2. Category 6 Cable Testing

a. Cable testing shall be performed with a Micro-Test Pentascanner Plus or equivalent test unit. Test unit shall be capable of providing a Level 2 accuracy test and have a category 6 printout.

b. Each outlet/cable shall be tested and certified. Each pair of the end to end system shall be tested. End to end is from the outlet RJ 45 port through the RJ45 port at the Category 6 data patch panel. A 10' patch cable shall be used at the patch panel end and a 3' patch cable shall be used at the outlet end so that the outlet, outlet termination, cable, patch panel termination, patch cables and patch panel port can be seen in the test.

c. Test results shall be positive and favorable. End to end attenuation loss and near end cross talk shall meet or exceed category 6, EIA/TIA 568, TSB 36 requirements. Those requirements are:

Frequency MHZ	Next Loss Worst Pair dB @ m (1000 ft) Category 6	Maximum Attenuation Loss Worst Pair dB/m (1000 ft) Category 6
1.0	62	63
4.0	53	13
8.0	48	18
10.0	47	20
16.0	44	25
20.0	42	28
25	41	32
31.25	40	36
62.5	35	52
100	32	67

d. If a problem or failed test occurs, the contractor shall evaluate and remedy the problem. After a problem has been remedied, the contractor shall re-test the circuit and analyze test results. The contractor shall continue this process until the cable passes all tests.

e. Each outlet/cable test shall include:

(1) Overall cable length
(2) System continuity
(3) Proper connectivity
(4) Open pairs
(5) Short circuits
(6) Reversed pairs
(7) EMI noise induction
(8) Damaged cable
(9) Stretched, chinked or crimped cable
(10) Attenuation loss in dB
(11) Near end cross talk in dB

f. Provide the owner with three (3) copies of the test units results for all cables.

3. Fiber Optic Cable Testing

a. The fiber cables shall be tested in both directions at 850 nanometers and 1300 nanometers.

b. All test results shall be in writing giving all readings, date, tested by, and totals.

c. All testing shall be performed by using an Optical Power Meter (Wilcom Model T339 or approved equivalent).

d. Each strand shall be tested and the following information be turned over to the owner in chart form:

(1) From Point to Point

(2) Fiber I.D. Label No.

(3) RX Level

(4) Attenuation Total

(5) Wave Length

(6) Reference Level

e. Each strand shall not exceed a level of 3.0db of attenuation.

f. Provide the owner with three (3) copies of the test results and certification for all cables.

3.0 EXECUTION

3.1 Workmanship

A. All work shall be executed in workmanlike manner and present a neat and mechanical appearance upon completion.

B. Balance load as equally as practical on services and all feeders, circuits, and panel busses. All wiring in panelboards shall be laced and looped in a workmanlike manner.

C. Upon completion of work, test entire wiring system and show to be perfect working order in accordance with intent of specifications and drawings. This Contractor to have all systems ready for operation and electrician available to assist in removal of panel fronts, etc., to permit inspection as required.

D. All work shall be in accordance with the National Electrical Code and the rules and regulations of the local bodies having jurisdiction.

3.2 Excavation Cutting and Patching

A. Provide cutting and patching required for this section of work under supervision of the General Contractor. Coordinate with other trades as work progresses so cutting and patching will be minimal.

3.3 Sleeves, Inserts, and Supports

A. Provide and install No. 16 gauge galvanized steel or iron sleeves in all walls, floors, ceilings, and partitions. Sleeves shall have not more than 1/2" clearance around pipes and insulation.

B. Contractor shall furnish to other trades all sleeves, insert, anchors and other required items which are to be built in by trades for the securing of all hangers or other supports by the Contractor.

C. Contractor shall assume all responsibility for the placing and size of all sleeves, inserts, etc., and either directly supervise or give explicit instructions for installation.

D. Seal all conduits through floor, smoke or fire walls and sound barrier walls. All such penetrations shall be made with an Underwriters' Laboratories firestop assembly. Through floor conduit shall be sealed water tight.

E. Furnish and install steel angles and channels as required for mounting and bracing heavy equipment, and conduits. Steel shall be securely bolted or welded to structure and equipment bolted to steel framework. Obtain approval of Architect prior to welding.

3.4 Roof Penetrations

A. Furnish roof flashing for all equipment installed under this section that penetrates through the roof. Galvanized sheet, 24 gauge with base extending 6" beyond pipe.

3.5 Grounding

A. All equipment shall be grounded and bonded in accordance with local regulations and National Electrical Code. Ground main service to code size cold water pipe and driven ground rod, maximum of 2 driven rods. All conduits entering a free standing switchboard or motor control center shall be bonded together with approved grounding lugs and bare copper wire.

B. Interior metal water piping shall be bonded to the system ground as outlined in NEC Section 250-80.

C. This Contractor shall bond all metal air ducts to the respective unit grounding conductor. Install additional bonding jumpers at joints, flexible sections, etc., to insure that entire duct system is bonded.

3.6 Conduit Installation

A. Where rigid conduits enter boxes secure in place by approved lock nuts and bushings. Where E.M.T. enters boxes secure in place with approved insulated fittings. Conduit ends shall be carefully plugged during construction.

B. Use of running threads is absolutely prohibited. Conduits shall be joined with approved conduit couplings.

C. Install conduit runs to avoid proximity to steam or hot water pipes. In no place shall a conduit be run within 3" of such pipes except where crossings are unavoidable, then conduit shall be kept at least 1" from the covering of the pipe crossed.

D. Before installing raceways for motors and fixed appliances, check locations of motors and appliance connections. Locate and arrange raceways appropriately.

E. Provide flexible conduit connections to all motors and/or any equipment which has moving or vibrating parts. Sealtite flexible conduit shall be used in all cases where exposed to moisture and in mechanical equipment rooms.

F. Exposed conduit runs shall be parallel and/or at right angles to building walls and/or partitions.

G. Where conduit crosses a structural expansion joint, an approved conduit expansion fitting will be installed.

H. Leave aluminum pull wire in all empty conduit.

I. Conduit shall be cut square and the ends reamed after threading.

J. Fasten conduit securely in place by means of approved conduit clamps, hangers, supports, and fastening. Arrangement and method of fastening all conduits subject to Architect's direction and approval.

K. Apply two (2) coats of asphaltum paints to all underground rigid conduit. Carefully retouch any breaks in paint and allow to dry before covering. Leave exposed until after Architect's inspection.

L. Conduits shall be sized in accordance with National Electrical Code as amended to date, except when the size is shown larger on the drawings.

M. Conduit with an external diameter larger than 1/3 the thickness of the slab shall not be placed in the slab. Conduit in the slab shall not be spaced closer than 3 diameters on center. No conduit in porous fill.

N. E.M.T. may be used where concealed in ceiling or walls where there is no danger of mechanical injury. Rigid conduit shall be used , where embedded in concrete, areas exposed to moisture and danger of mechanical injury, in hazardous areas, and for feeders and motor circuits. PVC shall be allowed for branch circuit conduits installed in floor slab (rigid steel 90's).

3.7 Wire and Cable Installation

A. No conductor shall be smaller than #12 except where so designated on the drawings or hereinafter specified.

B. Joints and splices on wire shall be made with solderless connectors, and covered so that insulation is equal to conductor insulation. Wire nuts not permitted.

C. Multi-wire lighting branches shall be used as indicated.

D. No splices shall be pulled into conduit.

E. Both conductors and conduits shall be continuous from outlet to outlet.

F. No conductor shall be pulled until conduit is cleaned of all foreign matter.

G. In installing parallel conductors, it is mandatory that all conductors making up the feeder be exactly the same length, the same size and type of conductor with the same insulation. Each group of conductors making up a phase or neutral must be bonded together at both ends in an approved manner.

3.8 Feeder Designation

A. Non-ferrous identifying tags or pressure sensitive labels shall be fastened securely to all cables, feeders and power circuits in vaults, pull boxes, manholes, switchgear and at termination of cables. Tags or labels shall be stamped or printed to correspond with markings on drawings so that feeder or cable number or phase can be readily identified.

3.9 Circuits and Branch Circuits

A. Outlets shall be connected to branch circuits as indicated on drawings by circuit number adjacent to outlet symbols, and no more outlets than are indicated shall be connected to a circuit.

3.10 Wire Joints

A. On copper wire larger than #12 joints shall be made with solderless connectors and covered with Scotch #33 Electrical Tape so that insulation is equal to conductor insulation. Connectors by Penn-Union or Anderson.

B. #12 and smaller wire joints shall be made with T & B Sta-Kon wire joints, complete with insulating caps, Ideal Wing nuts, or Buchannan Electrical Products Series 2000 pressure connectors complete with nylon snap-on insulators.

C. Joints on aluminum cable #0 and larger shall be made with compression lugs and bolted to terminals using stainless steel bolts and Belleville washers. Torque to 50 to 60 foot pound or torque with torque wrench. Aluminum cable and joints shall be used only where indicated on drawings. Connectors by Penn-Union or Anderson. Connection to panelboard by Burndy Connector and stud.

3.11 Outlet Boxes Installation

A. Outlet boxes shall be securely fastened.

B. Surface Fixture outlet boxes shall be set so edge of cover comes flush with finished surface.

C. There shall be no more knockouts opened in any outlet box than are actually required.

D. Boxes shall be sealed during construction. Protect interiors (including panel cans) from paint and mortar.

E. Unless otherwise shown, outlets shall be located as follows: centerline of boxes shall be following distance above the finished floor:

Receptacles General ----------	1'4" - Centerline
Receptacles Over Counters ----------	3'8" - Centerline
Telephone Outlets General ----------	1'4" - Centerline
Wall Telephone Outlets ----------	4'0" - Centerline
General Clock Outlets ----------	7'6" - Centerline
Switches General ----------	4'0" - Top
Fire Alarm Pulls ----------	4'0" - Top
Fire Alarm Signals ----------	6'8" - Bottom
Bells ----------	6'8" - Centerline
T V & Computer Outlets ----------	1'4" - Centerline

F. Symbols on drawings and mounting heights as indicated on drawings and in specifications are approximate only. The exact locations and mounting heights must be determined on the job and it shall be the Contractor's responsibility to coordinate with all trades to secure correct installation, i.e., over counter in or above back splashes, in stud walls, and other specific construction features. Mount all receptacles vertical. In block walls (exposed), use nearest joint as approved by Architect.

3.12 Fixture Installation

A. Support of all fixture shall be responsibility of this Contractor. Fixtures shall be supported independent of ceiling from structure members of building. Contractor shall submit typical hanging detail to Architect/Engineer before installing any fixtures. All grid fixtures shall be wired by flex individually to junction and not wired fixture to fixture.

B. Fixture conductors shall be connected by soldering and tying or by approved connectors.

C. All stems on fluorescent fixtures shall be installed as follows: except fixtures with slide grip hangers first and last stem in row in first knockout from end of fixture. One stem shall be installed between each two fixtures, stem shall center joint where fixtures join, and attach by use of "joining plates". All fixtures in continuous rows other than recessed grid type shall be connected by nipples with lock nuts and bushings.

D. Thoroughly clean all fixture lens and reflectors immediately prior to the final inspection.

3.13 Installation of Motors, Electric Heaters, and Controls

A. Provide feeders and make connections for motors, electric heating units and controls.

B. An approved H.P. rated safety switch shall be provided within sight of each motor and each heating unit. Provide fused switches where branch circuit fuses are not sized for overload protection. Weatherproof switches are to be used where switches are located outdoors. Safety switches shall be as manufactured by G.E., Square D, or Cutler Hammer.

C. Manual motor starters with thermal overload protection may be used in lieu of safety switches for motors under 1/2 H.P. Manufacturers shall be same as above.

D. The heating and air conditioning contractor shall furnish all motor starters.

E. The temperature control contractor shall furnish and install all low and line voltage wiring necessary for the temperature control systems and interlocking with air handling units, cabinet unit heaters.

F. The electrical contractor shall install all motor starters, except for factory mounted. He will furnish wire and disconnect switches. He will furnish and install all power wiring from the power panels on packaged equipment. He will not furnish nor install any low and line voltage wiring necessary for the temperature control system and interlocking with air handling units, or cabinet unit heaters.

3.14 Fire Alarm Installation

A. All wiring shall be in accordance with Local and National Codes and Article 210 of the National Board of Fire Underwriters Standard Number 72. Unless otherwise specified, minimum wire size shall be 12 gauge for A.C. and power supply connections, 14 gauge for audible alarm circuits and 14 gauge for signal initiating circuits, or wire size as indicated on drawings.

B. Wiring shall be run in conduit. In general, the wiring from the Control Panel shall consist of:

1. West Penn No. 995 shielded twisted pair common to all Fire Alarm stations or Detectors.

2. 4#14 wires common to each circuit of Fire Alarm Signals.

C. A factory trained representative for the manufacturer shall supervise the final testing of the system and it shall be subject to the approval and acceptance of the responsible engineer. On completing of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system.

3.15 Sound System Installation

A. All wiring shall be in accordance with local and national codes.

B. Wiring shall be run in conduit except where accessible above lay-in ceilings.

3.16 Alterations & Additions to Electrical Systems in Existing Building

Work in existing building shall be performed as indicated or requested to perform its intended function on Electrical and Architectural plans. This contract shall include removing, relocating, extending, etc., any items of electrical nature required to facilitate work as indicated. All circuits interrupted by rework shall be extended and left energized. Contractor shall include night and weekend work in bid as required to keep all outages to a minimum four (4) hours, during non-school hours only.

END OF SECTION 16000

PRE-CONSTRUCTION CONFERENCE CHECK-LIST

Project: **New Gymnasium Addition to Montevallo High School**

Funding: **PSCA**

Location: **TBD**

Date/Time: **TBD**

DCM Insp:

Please note that all items listed below may not be applicable to this project.

1. **Introductions / Sign In**

2. **Owner's Comments**

3. **Preface / Pass Along To Others**

4. **General Contractor's Team Members (contact information)**

   Project Manager: _____

   Superintendent: _____

5. **Verify all alternates accepted**.

6. **E-Verify. Alabama Immigration Law. Be sure that all subcontractors comply with E-Verify requirements.**

7. **List of Sub-Contractors, submit for approval.**
   A Complete list of sub-contractors must be submitted and approved by the Architect and Owner prior to any work commencing. Contractor cannot replace subs unless approved by the Architect and Owner (GCS 41)

8. **Cost Breakdown and Progress schedule.**
   Cost breakdown and progress schedule must be submitted and approved on proper state forms prior to first pay request. **GC is required to provide an updated progress schedule at each OAC.**

   Start: Completion Date: Days:

9. **Method of approving monthly pay request.**
   Due by the 25th of each month. Architect will verify, sign and forward to Owner, who will forward to DCM, if applicable.

10. **Allowances.**
    A. With the exception of quantity allowances, all allowances indicated are contingency allowances and therefore the Owner may transfer balances for other discretionary uses. Overhead and profit margins SHALL NOT BE ADDED to any amount drawn from original Allowance(s) regardless of the indicated use.

    B. Each contingency allowance shall be a "line item" on the Schedule of Values.

C. The following allowance(s) are a part of this project:

-
-

D. If applicable, note special material/equipment delivery dates associated with allowances.

-

11. Change Orders Requests. No work prior to final approval; Architect can approve in writing if emergency.

A. All changes in work are to be submitted via Change Order Request, regardless of monetary value.

B. COR's must be submitted in sequential order on GC letterhead.

C. All COR's must be broken down to the fullest degree, including breakdown of GC's cost by GC's labor, materials, subcontractor, sub-subcontractor cost and OH&P. Subcontractor and sub-subcontractor cost must be documented with copies of quotes detailing OH&P included.

D. COR's applied to allowances cannot include OH&P.

E. Credit COR's must include a minimum of 5% OH&P.

F. Upon Owner and/or Architects' approval of COR's, a revised Change Order and Allowance Usage log will be sent to GC via email.

G. GC is to maintain a COR Log and present updated copy at each OAC meeting.

H. NOTE: The following information is required for <u>ALL</u> Change Order Requests submitted:

a. Each material number shall include an invoice / quote listing unit quantities, unit price, and extended total.

b. Each labor number shall include a breakdown showing number of laborers, hours of labor worked, hourly wage, and extended total.

c. Each equipment number shall have an invoice / quote listing the hours of use, hourly rate, and extended total.

I. An official Change Order to the State <u>CANNOT</u> be prepared if all backup paperwork is not provided and accounted for.

J. This information is required for all contractors, subcontractors, and sub-subcontractors.

12. Shop Drawings.

A. Submittal Schedule must be submitted to Architect at or before Pre-Construction Conference. Correlate this submittal schedule with the listing of subcontractors and with list of materials as specified in contract documents. The submittal schedule should be in chronological order following the critical timing of the approval of submittals in accordance with the Work Progress Schedule.

B. Submit all items proposed for use in work. Do not combine submittals with requests for substitutions

C. Must bear GC's action stamp as APPROVED OR APPROVED AS NOTED. Contractor shall review and stamp approval and submit shop drawings, product data and samples far enough in advance to allow ample time for Architect review. Color selections may take longer than actual submittal approval, but in any case will not be given via phone calls. If submittals are not marked as approved by the GC, they will be returned without action.

D. Digital Copies: Provide via email to submittals@lathanassociates.com. Do not send directly to Architect. **See attached Sample.**

E. Submittal Preparation:

- **Include the following information on transmittal / email.**
  - Date
  - Project Name and Architect's Project Number.
  - Name of the General Contractor and Contact within company.
  - Subcontractor/Supplier.
- Clearly state **Number** and title of appropriate Specification Section and **Description** of Item and if applicable
  - Name of the Manufacturer.
  - Model / Style of Item

General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect no less than three (3) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with the sequence of construction, related specification divisions, engineers, consultants and owner's representatives. Allow no less than two (2) weeks for reprocessing.

NOTE: No extension of Contract Time and/or additional costs will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

F. Material shall not be fabricated or work performed without approval of respective submittal.

G. GC is to maintain copies of all approved shop drawings at the site and have available for architect and/or engineers at all times.

H. GC is to maintain a Submittal Log and present updated copy log at each OAC meeting.

I. **Important:** Contractor shall perform no portion of the work for which the contract documents require submittal and review of Shop Drawings, Data, Installer Qualifications, etc. until respective submittal has been approved by the Architect.

J. **Important:** Submittals are not Contract Documents and are not used to make changes in scope of project or intent of Contract Documents, and not used to request or IMPLY substitutions or to otherwise make changes in project requirements.

K. **Important:** The only changes that can be made to the project once it is bid, is through Change Order Requests and Approvals.

L. **Important:** After receiving approved digital submittals, General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days. Submittals are not considered complete until 2 copies have been received by the Architect. This may have a direct effect on pay requests or final payment.

13. CAD Files / PDF

A. This project was bid under the assumption that electronic CAD files would not be available.

B. Electronic CAD files are owned individually by each design professional according to discipline. If electronic CAD files or portions thereof are made available, be reminded that electronic CAD files can be manipulated and do not constitute the Contract Documents. The business of acquiring such files shall be between the contractor and the individual design professional. Fees may or may not be applicable. It shall be the Contractor's responsibility to investigate and procure at no added expense to the Owner.

C. PDF files shall be made available to the General Contractor for use during construction.

14. Advanced notice of required inspections.

The contractor will contact the architect by e-mail at inspections@lathanassociates.com of the date the project will be ready for an inspection by the DCM Inspector: Pre-Roofing, Fire Above Ceiling, Final, and Year End. Special Inspections shall be required for all work of the Storm Shelters and the Fire Water Lines. Schedule well in advance to prevent delays.

- Inspections must be requested 14 days in advance.
- When the DCM Inspector confirms the inspection time, the Architect will send an e-mail confirming the inspection time and date.
- Cancellations of any scheduled inspection must be received in writing by e-mail no less than 48 hours prior to the schedule inspection. If an inspection is cancelled, it will be rescheduled subject to the DCM Inspector's availability.
- If an inspection is cancelled less than 48 hours prior to the schedule inspection, the re-inspection fee of$1,500 will be charged.

15. Inspection Minimum Requirements.

The following minimum requirements listed below are provided to aid the contractors and architect in determining if a project is ready for a required inspection.

- Pre-Construction Conference
  - Required Attendees: Contractor, Owner, Architect, Major Subcontractors
  - Inspection Requirements:
    - ✓ Signed construction contract
    - ✓ Verification of payment of permit fee
- Above-Ceiling Inspections
  - Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors, DCM Inspector
  - Inspection Requirements:
    - ✓ All work must be completed except for installation of ceiling tiles and/or hard ceilings
    - ✓ Space must be conditioned
    - ✓ Permanent power must be connected unless otherwise arranged with the DCM Inspector
    - ✓ Grease duct must be inspected and approved by the DCM Inspector prior to fire wrapping and Above-Ceiling Inspection
- Life Safety Inspections and Final Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshal, DCM Inspector
  - Inspection Requirements:
    - ✓ Fire alarm certification
    - ✓ Kitchen hood fire suppression system certification
    - ✓ General Contractor's 5-Year Roofing Warranty (ABC Form C-9)
    - ✓ General Contractor's Five Year Building Envelope
    - ✓ Above ground and below ground sprinkler certifications
    - ✓ Emergency and exit lighting tests
    - ✓ Fire alarm must be monitored
    - ✓ Elevator Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor
    - ✓ Boiler/Vessels Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor

- ✓ Flush test for underground sprinkler lines (witnessed by local fire marshal, fire chief and/or DCM Inspector)
- ✓ Flush/pressure test for new and/or existing fire hydrants
- ✓ Must have clear egress/access and emergency (for first responders) access to building
- ✓ Must have ADA access completed

- Year-End Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers and /or Major subcontractors may also be required to attend
  - Inspection Requirements:
    - ✓ Owner 's list of documented warranty items

16. Above Ceiling Inspection by the Architect, Engineers and DCM Inspector.

No above ceiling work is to be done after the Above Ceiling Inspection other than correction of deficiencies noted during the inspection. (Pre-Above Ceiling Inspection)

Fire Caulking Tented fixtures Wire at Light Fixtures Debris
Temporary Lighting Penetrations Pipe Saddles
Insulation - No Kraft - Exposed Fire-Rated FSK or FRK - Type III, Class A.

17. Other inspections required before work is covered.

A. Local inspectors may require a full range of inspections on this project, footings, under-slab, etc. A wall inspection will be held before any finish paints are applied.
B. Material Testing.

18. Observation report distribution.

Architect will submit field reports promptly to the Owner, GC, DCM Inspector. Architect will fill in all blanks on the field report form.
(GCS 16 & MP 8D)

19. Record drawings, definitions of procedures.

G.C. is to keep all changes made in the field red lined daily. Cut and paste all addendums onto the plans at their respected locations. One clean set of plans is to be secured at the job trailer at all times for review by all interested parties. This set with changes could be used as the record drawings. Final pay approval is subject to receipt of these as-built drawings.

20. Project sign and other job signs.

State required sign is the only sign allowed on project.
Job trailers with contractor and/or sub-contractor names are allowed.

21. Overall phasing of project.

Superintendent is responsible to plan ahead in order to avoid delays and conflicts. GC is to advise Architect on delays of critical path items. Superintendent is to be on site at all times when any work is in progress; no exceptions (GCS 6A & B)

22. Contractor's duty to coordinate work of separate contractor.

Contractors employed by others for installation of data, computer and etc. (GCS 40D)

23. Use of existing site, building and access drive.

A. Use of existing building site for lay down is to be determined by local owner and Architect. Local owner will advise contractor on proper route to site. Material delivery times are to be made as to not interfere with the school bus schedule. Area is to be reviewed after this meeting, if necessary. Maintain traffic flow.

B. No workmen are allowed in existing building, unless prior approval is granted by the Owner and arranged by the General Contractor. There is to be no communication between

workers and faculty/staff or students; through vocal, looks, stares or body language.

C. Since most projects are hard hat areas, the worker's name will be on his/her hat for identification purposes.

D. If a faculty/staff member or student is causing a problem with a worker, the worker is to report the incident to the Project Superintendent. The Superintendent should then report the incident to the Owner. Under no circumstances should the Worker try and handle the problem by him/herself.

E. There is to be no profanity on the job site.

F. School Lunchroom is off limits to workers.

G. Use of existing site, building and access drive.

H. Workmen are expected to dress appropriately. Tee-shirts are expected to be non-offensive to all parties.

I. State school properties are tobacco free areas. No smoking, chewing, or dipping of tobacco products are allowed.

J. State school properties are drug free areas. Vehicles are subject to search and seizure by law enforcement authorities.

K. Firearms are not allowed on school property. Cased, uncased, loaded, or unloaded.

24. Use of existing toilets.
There will be no use of existing toilets. G.C. is to provide proper number of toilets for all workers. School telephone is off limits.

25. Coordinate any utilities supplied by the Owner / New equipment.
A. Existing sites, normally water only.
B. Coordination - OAC /Sub Meetings
C. New equipment utilities may be different than those existing utilities that the design is based upon. Coordinate with actual equipment cut sheets submitted and approved.

26. Coordinate outages with Owner.
Provide as much notice as possible. Superintendent is to verify that coolers and freezers are back on line. Coordinate with key testing date, do not disrupt on-going school operations. *Roofing fumes must be minimized with afterburner.*

27. Keeping existing exit paths open.
Required exits are to be maintained at all times.

28. Routine job clean up.
Debris is to be removed daily/weekly from building and site. Do not allow dumpster to spill over. Burning of trash on site is not allowed. (GCS 48, A & C)

29. Safety is General Contractor's responsibility.
As a courtesy, advise the Architect if there has been a problem.

30. Project limits.
Defined on drawings.

31. Building location relative to critical property line. Easements, Setbacks, etc.
Review with Architect before starting work.

32. Location of property lines, corners, etc.

Review with Architect before starting work.

33. Verify sanitary outfall before committing to floor level.
Plumber is to advise Superintendent ASAP and Superintendent is to notify Architect if there is a problem.

34. Procedure if bad soil is encountered.
Contact Architect immediately.

35. Stockpiling top soil.
On existing sites, location is to be approved by the Architect and Owner.

36. Protect existing trees, shrubbery, landscaping, sidewalks, curbs and etc. if intended to remain.
GC is to leave existing site in same condition as when project started.
***If disturbing more than 1 acre, discuss ADEM requirements.*

37. Soil compaction, type soil, lab test, etc.
Testing Engineer is to approve compaction. Soil type is listed in the specs. For lab tests, refer to the specs. Testing disclosure.

38. Soil Treatment.
Soil treatment provider is to come to the site with empty tank. Use on site water. Superintendent is to witness the treatment container seals broken and mix prepared. No pre-mixed material is to be brought to the site.

39. Surveyor to check foundation wall. Location is critical.

40. Ready mix plant, file delivery tickets, slump and cylinder test.
Protect cylinders until tested. Superintendent is to have on file, at all times, the delivery tickets, slump and cylinder test results.

41. Quality of concrete work. Concrete testing.
Concrete is to be free of hollows and humps. Finish floor areas are to be no more than 1/8" in 10'. Review specs for slump requirements. Do not add water to concrete without approval of Geotechnical personnel.

42. Materials Testing / Re-testing
Retesting shall be the at the contractor's expense.

43. Inspection before pouring concrete.
Two (2) day notice is required before you pour footings. Architect must approve all concrete placement. Pictures are not acceptable. Prior to footing inspection, all footings will be cleaned of loose soil, debris, and water. Steel is to be properly tied and supported.

44. What is expected of masonry work, mortar additive.
All masonry work shall be as stated in the specs. Full head and bed bull-nose outside corners. Joints are expected on both sides of the units. Pre-formed corner tees, durowall and flashing are required. Mortar mix shall be made with same proportions everyday throughout entire project, using appropriate measuring devices. For tooling of brick or block, refer to specs. No brick or block less than a half unit is allowed at any opening. Full head weeps at 32" on center. All substandard masonry will be removed. Cull blocks; do not lay chipped blocks. Cut holes for electrical outlet boxes the proper size; caulking and oversized plates are not allowed.

45. **Problems with hollow metal (install proper fire labels)**.
Do not paint fire labels. Labels will be attached; rating is to be embossed in minutes and/or hours. Specs require coating the interior of the frames. Grout frames solid.

46. **Pre-roofing conference. No roofing materials installed prior to conference.**
Contractor, manufacturer and applicable suppliers are required to be present.
Verify with DCM inspector if underlayment installation is acceptable prior to pre-roofing conference.

47. **G.C. is to have copies of all required roofing warranties in hand at the final inspection.** i.e. Manufacturers' and DCM Five Year warranty issued by the General Contractor and the Roofing Subcontractor, (which is to be dated the date of the substantial completion), or final cannot be held.

48. **Potential conflict of mechanical and electrical equipment.**
It is the responsibility of the GC to coordinate the installation of all equipment where a conflict may occur. G.C., HVAC, Plumbing and Electrical subs are to read their sections of specs. Each foreman is to sign their section on the master copy, which is kept in the job trailer.

49. **Problems with fire damper installations.**
Installation of the dampers will be as shown on the plans. All other installation procedures will be unacceptable.

A. Fire stop material; workmen must be certified to install firestop material. Firestop system must be a UL approved assembly. (See manufactures' manual).

B. Stencil all fire walls, both sides every 20ft.

50. **Certificate of Substantial Completion.**
Architect will provide at the final inspection, provided contractor has copies of all roof warranties and the fire alarm certification.

51. **Project Closeout Procedures / Final payment.**

A. Warranties must be effective the Date of Substantial Completion. All warranties must identify the product covered.

B. Operating and maintenance manuals. All training required for the MPE fields will be completed prior to the final request being released.

C. As-built drawings.

D. Other requirements. G.C. is to make a list of all over-stocks that are required by specs and have at final for B.O.E. signature and acceptance.

E. Final Payment. Punch list items must be completed to the Architect and DCM Inspector's satisfaction, all close out documents must be received by the Architect, all change orders must be fully executed and Certificate of Substantial Completion must be fully executed before final payment is made. (GCS, 34A & B, MP 7 G4)

52. **Advertisement of Completion. Start ad after substantial completion.**

A. 1 week for projects valued less than $50,000.00.

B. 4 consecutive weeks for projects exceeding $50,000.00.

C. General Contractor is responsible for placement and payment of advertisement.

53. **Time Extensions.**
The GC can submit time extension request to the Architect on a weekly basis, with reasons for extension. Delays caused by rain, must exceed the five year average. (GCS 23).

54. **Quality Control.**

Urinals 17" A.F.F. Flush valves at wide side. Rigid conduit under slab. Fire strobes 80" to bottom, within 15' of exits.

55. Requests For Information (RFI'S)

A. All RFI's must be numbered and made in writing to the Architect's email **rfi@lathanassociates.com** by the General Contractor. Please include your name, company name, telephone number, and fax number so that we may respond appropriately. Verbal RFI's will not be answered. All RFI's must be in writing.

B. The Architect will not accept RFI's directly from subcontractors or vendors.

C. The Team List provided within the Specification Manual is for informational purposes only and should not be used to contact Engineers and/or Consultants directly with questions regarding the project.

D. All questions that need to be directed to an Engineer / Consultant must be routed through the Architect's office. If applicable, the Architect will contact the appropriate Engineer / Consultant for information.

E. Bids shall be based upon the official Contract Documents consisting of Plans, Specifications and Addenda. Architect assumes no responsibility for information used by Contractors outside the official Contract Documents.

F. **A RFI Log shall be kept by the Contractor and reviewed at each OAC Meeting.** It will be the contractor's responsibility to inform Architect of any outstanding RFI's in a timely manner.

56. Liquidated Damages

Liquidated damages will be strictly enforced for not reaching substantial completion by the scheduled completion date. Liquidated damages will be deducted from the General Contractors final payment.

57. Miscellaneous: