PROJECT MANUAL

MIB RENOVATIONS

Evergreen, Alabama

for

Reid State Technical Community College

(Local Funds)



ISSUE FOR BID

April 30, 2026

Prepared By

GMC

Goodwyn Mills Cawood, LLC.
2400 5th Avenue South, Suite 200
Birmingham, AL 35233
T 205.879.4462
www.gmcnetwork.com

GMC PROJECT NUMBER: ABHM260005

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The Project Manual, Technical Specifications, Drawings, and all other documents relating to this project have been prepared for this individual and particular project, and for the exclusive use of the original Owner, developer or other party so indicated.

Actual project conditions and as-built conditions may vary significantly. Changes made during bidding, negotiations, construction, due to additions or deletions of portions of this project, and/or for other reasons, may not be indicated in these documents.

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GOODWYN MILLS CAWOOD, LLC.

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SECTION 00 0103
PROJECT DIRECTORY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification of project team members and their contact information.

1.02 OWNER:

A. Name: Reid State Community College
   1. Address Line 1: 100 Hwy 83.
   2. Address Line 2: Building 300 and 700.
   3. City: Evergreen.
   4. State: AL.
   5. Zip Code: 36401.

1.03 CONSULTANTS:

A. Architect: Design Professional of Record. All correspondence from the Contractor regarding construction documents authored by Architect's consultants will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
   1. Company Name: Goodwyn Mills Cawood, LLC.
      a. Address Line 1: 2400 5th Avenue South, Suite 200.
      b. City: Birmingham.
      c. State: AL.
      d. Zip Code: 35233.
      e. Telephone: 205-879-4462.
   2. Primary Contact:
      a. Title: Project Manager.
      b. Name: Hunter Swatek, AIA.
      c. Email: hunter.swatek@gmcnetwork.com.

B. Civil Engineering Consultant:
   1. Company Name: Goodwyn Mills Cawood, LLC.
      a. Address Line 1: 2400 5th Avenue South, Suite 200.
      b. City: Birmingham.
      c. State: AL.
      d. Zip Code: 35233.
      e. Telephone: 205-879-4462.
   2. Primary Contact:
      a. Name: Juan Gacha, PE.
      b. Email: juan.gacha@gmcnetwork.com.

C. Landscape Architecture Consultant:
   1. Company Name: Goodwyn Mills Cawood, LLC..
      a. Address Line 1: 2400 5th Avenue South, Suite 200.
      b. City: Birmingham.
      c. State: AL.
      d. Zip Code: 35233.
      e. Telephone: 205-879-4462.
   2. Primary Contact:
      a. Name: Patrick Ritchey, LA.
      b. Email: patrick.ritchey@gmcnetwork.com.

D. Structural Engineering Consultant:

1. Company Name: Tucker-Jones Engineers Associates.
    a. Address Line 1: 3300 Cahaba Road, Suite 210.
    b. City: Birmingham.
    c. State: AL.
    d. Zip Code: 35223.
    e. Telephone: 205-879-5660.
2. Primary Contact:
    a. Name: Greg Tucker, PE.
    b. Email: gtucker@tuckerjones.com.

E. Mechanical and Plumbing Engineering Consultant
1. Company Name: M W Davis Dumas & Associates.
    a. Address Line 1: 4500 Southlake Park Ste 200.
    b. City: Birmingham.
    c. State: AL.
    d. Zip Code: 35244.
    e. Telephone: 205-252-0246.
2. Primary Contact:
    a. Name: Sammy Davis, PE.
    b. Email: sdavis@mwdda.com.

F. Electrical Engineering Consultant:
1. Company Name: Jackson Renfro & Associates, Inc..
    a. Address Line 1: 31 Inverness Parkway, Suite 300.
    b. City: Birmingham.
    c. State: AL.
    d. Zip Code: 35242.
    e. Telephone: 205-995-1078.
2. Primary Contact:
    a. Name: Bobby Renfro, PE.
    b. Email: bobby@jraee.com.

PART 2 PRODUCTS - NOT USED

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ADVERTISEMENT FOR PREQUALIFICATION AND BIDS

PREQUALIFICATION PROPOSALS will be received via email, or other electronic transmission, on behalf of the Owner by Goodwyn Mills Cawood, LLC., at 2400 5th Avenue South, Ste. 200, Birmingham, AL 35233, for the below referenced project, until **2:00 PM Local Time, April 28, 2026.** The prequalification procedure is intended to identify responsible and competent bidders relative to the requirements of the Project. Prequalification proposal requirements may be obtained from the Architect, by request either by phone (205.879.4462) or e-mail kayla.thomas@gmcnetwork.com, to Kayla Tomas. Additional qualifications and requirements for General Contractor Bidders and separate Subcontractors are indicated in the Bid and Contract Documents.

SEALED PROPOSALS will be received only from previously PRE-QUALIFIED General Contractors by Alabama Community College Systems located at Building 700, 100 AL-83, Evergreen, AL 36401 until 2:00 PM Local Time, May 21, 2026, for this project:

MIB WORKFORCE RENOVATION
REID STATE TECHNICAL COMMUNITY COLLEGE
EVERGREEN, ALABAMA

(LOCALLY FUNDED)

at which time and place they will be publicly opened and read.

A cashiers check or bid bond payable to Alabama Community College Systems in an amount not less than five (5) percent of the amount of the bid, but in no event more than $10,000, must accompany the bidder's proposal. Performance and statutory Labor and Material Payment Bonds, and insurance in compliance with requirements, will be required at the signing of the Contract.

Drawings and Specifications may be examined at the Office of the Architect; Dodge Data & Analytics; Data Fax; and ConstructConnect.

Bid documents (Plans, Specifications, and Addenda) will be sent to prequalified General Contractors only from the Architect electronically with no deposit. Subcontractors should contact a General Contractor or plan room for documents.

Only General Contractors who have completed the prequalification process within the stated time limits, and which are properly licensed in accordance with criteria established by the State Licensing Board for General Contractors under the Provision of Title 34, Chapter 8, Code of Alabama, 1975, as amended, will be considered for prequalification for the Work of this project.

A **MANDATORY PRE-BID CONFERENCE** will be held at the same location as bids are to be opened, at **10:00AM local time May 12, 2026,** for the purpose of reviewing the project and answering Bidder's questions. **Attendance at the Pre-Bid Conference IS REQUIRED for all General Contractor Bidders** intending to submit a Proposal, and is highly recommended for Subcontractors. Bids from General Contractors not attending the Pre-Bid Conference will be rejected.

Per the Owner and the Alabama Department of Revenue (ADOR), Act 2013-205, the project will be bid **EXCLUDING TAXES** and will require the Contractor to complete ACCS Form 5-A Accounting of Sales Tax Attachment to ACCS Form 5-E Proposal Form which will be submitted with the Contractors Proposal at the time of the Bid. If awarded the bid, both tax exempt entity and contractor shall apply for certificates of exemption. ADOR shall issue certificates of exemption from sales and

use tax for each tax exempt project. Certificates shall only be issued to contractors licensed by the State Licensing Board for General Contractors or any subcontractor working under the same contract. Items eligible for exemption are building materials, construction materials and supplies and other tangibles that become part of the structure. ADOR will handle the administration of the certificates and the accounting of exempt purchases.

The Owner reserves the right to reject any or all proposals, to waive technical errors and/or abandon the prequalification and bid process if, in their judgment, the best interests of the Owner will thereby be promoted.

ALABAMA COMMUNITY COLLEGE SYSTEMS
P.O. BOX 302130
MONTGOMERY, ALABAMA 35213

GOODWYN MILLS CAWOOD, LLC.
MEMBERS, AMERICAN INSTITUTE OF ARCHITECTS
2400 5th Avenue South, Suite 200
Birmingham, Alabama 35233
Phone: (205) 879-4462
Fax: (205) 879-4493

****

END OF ADVERTISEMENT

FACILITIES MANAGEMENT

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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 exceeds $100,000, 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) ACCS Form 5-E: 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 ACCS Form 5-H: 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) ACCS Form 5-H: Accounting *of* Sales Tax

A completed ACCS Form 5-H: Accounting of Sales Tax must be submitted with ACCS Form 5-E: Proposal Form. Submission of ACCS Form 5-H 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 shall 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 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 BID ALTERNATES:

(A) Bid Alternates: Additive alternate bids are preferred, and may be used in order to obtain prices for the addition of items not included in the base bid. The alternate bids shall be listed in the Proposal Form.

(B) Deductive Bid Alternates: Deductive alternate bids shall only be used with the prior approval of the Chief Facilities Officer.

(C) ACCS reserves the right to select or reject some, any, or all alternates in making the final determination of the lowest responsible and responsive bidder to whom the Construction Contract is awarded.

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. Each unit price is to include overhead, profit, and all other related costs.

(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. Each unit price is to include overhead, profit, and all other related costs.

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.

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.

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

FACILITIES DIVISION

ACCS FORM 5-E

PROPOSAL FORM

To: Alabama Community College System Date: _____

In compliance with the 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:

in accordance with Drawings and Specifications, dated _____ , prepared by:

_____ , Architect/Engineer

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.

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:

For Alternate No. 1 (<Keyword for Amount>) ◯ add ◯ deduct $

For Alternate No. 2 (<Keyword for Amount>) ◯ add ◯ deduct $

For Alternate No. 3 (<Keyword for Amount>) ◯ add ◯ deduct $

For Alternate No. 4 (<Keyword for Amount>) ◯ add ◯ deduct $

For Alternate No. 5 (<Keyword for Amount>) ◯ add ◯ deduct $

For Alternate No. 6 (<Keyword for Amount>) ◯ add ◯ deduct $

UNIT PRICES - (Attach to this Proposal Form the unit prices, if any, on a separate sheet.)

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 so comply.

Attached hereto is a (Mark the appropriate box and provide the applicable information):

- ☐ Bid Bond, executed by _____ as Surety,
- ☐ A cashier's check on the _____ Bank: _____,
  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):** _____

*Name & Title (Print):

Telephone Number:

Email Address:

(SEAL)

* If other than the 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.

FACILITIES DIVISION

ACCS FORM 5-F

BID BOND

- *Do not staple this form; use clips.*

The **PRINCIPAL** (Bidder's Company Name and Address)
Name:
Address:

The **SURETY** (Company Name and Primary Place of Business)
Name:
Address:

The **OWNER**
Name: Alabama Community College System
Address: 135 S. Union Street, Montgomery, AL 36130

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- day of -Month- -Year-

PRINCIPAL: _____ **ATTEST:**

BY: _____ _____
NAME AND TITLE

SURETY: _____ **ATTEST:**

BY: _____ _____
NAME AND TITLE

FACILITIES DIVISION

ACCS FORM 5-H

(Must be submitted with ACCS Form 5-E)

ACCOUNTING OF SALES TAX

ATTACHMENT TO ACCS FROM 5-E: PROPOSAL FORM

TO:		**DATE:**	
NAME OF PROJECT:			

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:			Dollars $
For Alternate No. 1 (	<Keyword for Amount>)	◯ add	◯ deduct $
For Alternate No. 2 (	<Keyword for Amount>)	◯ add	◯ deduct $
For Alternate No. 3 (	<Keyword for Amount>)	◯ add	◯ deduct $
For Alternate No. 4 (	<Keyword for Amount>)	◯ add	◯ deduct $
For Alternate No. 5 (	<Keyword for Amount>)	◯ add	◯ deduct $
For Alternate No. 6 (	<Keyword for Amount>)	◯ add	◯ deduct $

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 (Print):

*Title (Print):

*Telephone Number:

Email Address:

(SEAL)

Note: A completed ACCS Form 5-H: Accounting of Sales Tax must be submitted with ACCS Form 5-E: Proposal Form. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

810-6-3-.77 Exemption For Certain Purchases By Contractors And Subcontractors In Conjunction With Construction Contracts With Certain Governmental Entities

(1) On and after January 1, 2014, the sale to, or the storage, use, or consumption by, any contractor or subcontractor of any tangible personal property to be incorporated into realty pursuant to a contract entered into on or after January 1, 2014, with a governmental entity is exempt from all state, county, and municipal sales and use taxes.

For this rule, a governmental entity is defined as:

(a) The State of Alabama.

(b) A county or incorporated municipality of the State of Alabama.

(c) An educational institution of the State of Alabama, or a county or incorporated municipality of the State of Alabama.

(d) An industrial or economic development board or authority that is exempt from the payment of Alabama sales and use taxes.

(e) Other governmental entities that are exempt from the payment of Alabama sales and use taxes excluding those agencies as provided in sections (2) and (3) below.

(f) On and after January 1, 2019, the term governmental entity includes any public water or sewer authority, district, system, or board that otherwise is exempt from sales and use tax. The sale to, or the storage, use, or consumption by, any contractor or subcontractor of any tangible personal property to be incorporated into realty pursuant to a contract entered into on or after January 1, 2019, with any public water or sewer authority, district, system, or board that otherwise is exempt from sales and use tax is exempt from all state, county, and municipal sales and use taxes.

(g) On or after January 1, 2020, the term governmental entity includes any airport authority established pursuant to Chapter 3 of Title 4 of the Code of Ala. 1975, that otherwise is exempt from sales and use tax. The sale to, or the storage, use, or consumption by, any contractor or subcontractor of any tangible personal property to be incorporated into realty pursuant to a contract entered into on or after January 1, 2020, with an airport authority that otherwise is exempt from sales and use tax is exempt from all state, county, and municipal sales and use taxes.

(h) On and after January 1, 2022, the purchase of construction materials for use on construction projects for governmental entities; to include any contract for the construction of highways, roads, or bridge projects is exempt from all state, county, and municipal sales and use taxes.

(2) Purchases Not Exempt. The exemptions outlined in section (1) do not apply to any of the following:

(a) Purchases of tangible personal property by a contractor or subcontractor for storage, use, or consumption in conjunction with performing a contract with a governmental entity that is not itself exempt from Alabama sales and use taxes.

(b) Purchases of tangible personal property by a contractor or subcontractor that are not incorporated into realty pursuant to the contract.

(c) Purchases of tangible personal property for contracts with the federal government.

(d) Purchases of tangible personal property made pursuant to any contract entered into prior to applicable date set forth in section (1), (1)(f), (1)(g), or (1)(h) above, as applicable.

(3) Exclusion from Governmental Entity Exemption. The exemption outlined in section (1) does not apply to the sale to, or the storage, use, or consumption by, any contractor or subcontractor of any tangible personal property to be incorporated into realty pursuant to a contract with a state other than the State of Alabama, a county or incorporated municipality of a state other than the State of Alabama, an industrial development board created pursuant to the Constitution or general or local laws of a state other than the State of Alabama, an educational institution of a state other than the State of Alabama, or an educational institution of a county or incorporated municipality of a state other than the State of Alabama.

(4) Application Requirements. In order to qualify for the sales and use tax exemption referenced in section (1), the governmental entity must complete an application (Form ST: EXC-01) for a sales and use tax certificate of exemption (Form STC-1) for each tax-exempt project. Contractors and subcontractors licensed by the State Licensing Board for General Contractors, must also apply per project to the Department of Revenue for a sales and use tax certificate of exemption (Form STC-1). Upon review and approval of the application, the department shall issue the applicant a Form STC-1 which shall be used by the certificate holder to claim the exemption when making qualifying tax-exempt purchases for the project listed on the certificate. Before approving or denying the application, the Department of Revenue may require the applicant to submit additional documentation that the property to be purchased tax-exempt with the certificate will be incorporated into realty pursuant to contracts with one of the governmental entities enumerated in section (1) or to subcontracts arising from contracts with one of the governmental entities enumerated in section (1). If the

department denies the application, the applicant may appeal the denial in accordance with §40-2A-8, Code of Ala. 1975.

(5) Record Retention Requirement. A contractor or subcontractor who obtains a Form STC-1 must comply with all of the provisions of §40-23-9, Code of Ala. 1975, and must maintain records sufficient to document the tax-exempt status of qualifying purchases. Further, the contractor or subcontractor who presents Form STC-1 to a vendor for purchases of tangible personal property without the payment of sales or use tax must make an electronic report of all exempt purchases to the Department of Revenue on their assigned consumer use tax return (Form 2610). The report of exempt purchases shall be a prerequisite to the renewal of a certificate of exemption. Failure to report the exempt purchases will result in an assessment against the contractor or subcontractor for sales and use taxes on any items purchased with the certificate of exemption.

(6) Violation Penalties. Any contractor or subcontractor who intentionally uses a certificate of exemption (STC-1) in violation of §40-9-14.1, Code of Ala. 1975, will be:

(a) Liable for the actual sales and use tax due.

(b) Subject to a civil penalty levied by the department in the amount of not less than a minimum of two thousand dollars ($2,000) or two times any state and local sales or use tax due for the tangible personal property, whichever is the greater.

(c) May be barred from the use of any certificate of exemption (STC-1) on any project for up to two years based on the contractor's or subcontractor's willful misuse of a certificate of exemption. Contractors and subcontractors may appeal any such decisions in accordance with §40-2A-8, Code of Ala. 1975.

(7) Determination of Qualification According to Date. (a) The date of the sale to, or the purchase, withdrawal, storage, use or consumption by, the contractor must be used to determine if an otherwise qualifying transaction or event qualifies for the exemption. Jobs or projects entered into prior to the applicable dates noted in section (1), (1)(f), (1)(g), or (1)(h) above shall not qualify for the exemption regardless of the transaction date.

(b) For the purpose of this rule, the term "entered into" means the date that a contractor or subcontractor signs a contract with a governmental entity defined in section (1).

Authors: Michelle Mayberry, Traci Floyd, Ginger L. Buchanan, Lee Ann Rouse

Authority: §§40-2A-7(a)(5), 40-2A-8, 40-23-9, 40-23-31, 40-23-83, Code of Ala. 1975.

History: New Rule: Filed February 20, 2001; effective March 27, 2001.
Amended: Filed May 6, 2005; effective June 10, 2005.
Amended: Filed November 20, 2013; effective December 25, 2013.
Amended: Filed January 11, 2019; effective February 25, 2019.
Amended: Filed December 20, 2021; effective February 13, 2022.

SECTION 00 4000.05
ALABAMA DEPARTMENT OF REVENUE TAX EXEMPTION GUIDANCE AND FORMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. ALABAMA DEPARTMENT OF REVENUE TAX EXEMPTION GUIDANCE AND FORMS follow herein and are available at www.revenue.alabama.gov.

1.02 LISTED DOCUMENTS

A. ALDOR Rule 810-6-3.77 - Exeption for Certain Purchases By Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Government Entities.

B. ALDOR Form ST: EXC-01 - Application for Sales and Use Tax Certificate of Exemption for Government Entity Projects.

C. Instructions for Preparation of Form ST: EXC-01.

D. State of Alabama Department of Revenue NOTICE: Guidance for Contractors, Subcontractors and Alabama Governmental Entities Regarding Construction-related Contracts.

END OF SECTION

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SECTION 00 4000.05
ALABAMA DEPARTMENT OF REVENUE TAX EXEMPTION GUIDANCE AND FORMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

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D. State of Alabama Department of Revenue NOTICE: Guidance for Contractors, Subcontractors and Alabama Governmental Entities Regarding Construction-related Contracts.

END OF SECTION

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ST: EXC-01
7/22

ALABAMA DEPARTMENT OF REVENUE
SALES AND USE TAX DIVISION

P.O. Box 327710 • Montgomery, AL 36132-7710

Reset

Application For
Sales and Use Tax Certificate of Exemption

FOR GOVERNMENT ENTITY PROJECT

This Certificate of Exemption will be limited to purchases which qualify for an exemption of sales and use taxes pursuant to Rule No. 810-6-3-.77

PROJECT INFORMATION:

PROJECT NAME				PROJECT OWNER'S FEIN (EXEMPT ENTITY)
STREET ADDRESS OF PROJECT (CITY AND COUNTY INCLUDED)	CITY	ZIP	COUNTY	

APPLICANT'S INFORMATION:

RELATION: *(CHOOSE ONE)*

☐ Government Entity ☐ General Contractor ☐ Subcontractor

APPLICANT'S LEGAL NAME				FEIN
DBA				CONSUMER'S USE TAX ACCOUNT NUMBER
MAILING ADDRESS: STREET	CITY	STATE	ZIP	COUNTY
CONTACT PERSON				BUSINESS TELEPHONE NUMBER
				( )

EMAIL ADDRESS

PROJECT START DATE	PROJECT END DATE

WILL THE APPLICANT HAVE ANY SUBCONTRACTORS ON THIS JOB?	NAME OF PARTY TO THE CONTRACT
☐ Yes ☐ No If yes, please attach list.	

JOB DESCRIPTION

WILL ANY POLLUTION CONTROL EXEMPTION BE APPLICABLE?	ESTIMATED POLLUTION CONTROL COST
☐ Yes ☐ No	$

TOTAL PROJECT BID AMOUNT (APPLICANT'S PORTION OF PROJECT)	LABOR COST (APPLICANT'S PORTION OF PROJECT)	MATERIAL COST (APPLICANT'S PORTION OF PROJECT)
$	$	$

REVENUE DEPARTMENT USE ONLY

PENDING DOCUMENTATION / INFORMATION:

☐ GCL ☐ SBL ☐ Contract / NTP / LOI ☐ LOS ☐ Project Dates / Breakdown of Costs

Contact Dates: _____ Received Date: _____

_____ Forwarded for Denial: _____

PROJECT NAME	PROJECT OWNER'S FEIN (EXEMPT ENTITY)

FORM OF OWNERSHIP:

☐ Individual ☐ Partnership ☐ Corporation ☐ Multi member LLC ☐ Single member LLC ☐ Government Entity

If applicant is a corporation, a copy of the certified certificate of incorporation, amended certificate of incorporation, certificate of authority, or articles of incorporation should be attached. If the applicant is a limited liability company or a limited liability partnership, a copy of the certified articles of organization should be attached.

OWNERSHIP INFORMATION:

Corporations – give name, title, home address, and Social Security Number of each officer.

Partnerships – give name, home address, Social Security Number or FEIN of each partner.

Sole Proprietorships – give name, home address, Social Security Number of owner.

LLC – give name, home address, and Social Security Number or FEIN of each member.

LLP – give name, home address, and Social Security Number or FEIN of each partner.

NAME *(PLEASE PRINT)* _____ SIGNATURE _____

TITLE _____ DATE _____

REVENUE DEPARTMENT USE ONLY

PENDING OTHER:

☐ Government Entity ☐ General Contractor ☐ Not on LOS

Contact Dates: _____ Received Date: _____

_____ Forwarded for Denial: _____

Examiner's Remarks _____

Examiner _____ Date _____

Instructions For Preparation of Form ST: EXC-01
Sales and Use Tax Certificate of Exemption for Government Entity Project

NOTE: Exemption Certificates will be issued as of the project start date or the received date of the application. If, upon receipt of the application, the project has already commenced, the certificate will be issued as of the received date of the application. Any purchases made prior to the issuance of a certificate will not be exempt.

In order to expedite the processing of your application, please include the following documentation when submitting your application:

Exempt Entity:
1. Signed Application
2. Copy of Executed/Signed Contract, Letter of Intent, Notice of Award, and/or Notice to Proceed

General Contractor:
1. Signed Application
2. Copy of Executed/Signed Contract, Letter of Intent, Notice of Award, and/or Notice to Proceed
3. List of Subcontractors
4. Alabama Board of General Contractor's License
5. State/County Business License (usually obtained through county probate office)

Subcontractor:
1. Signed Application
2. Alabama Board of General Contractor's License
3. State/County Business License (usually obtained through county probate office)
4. List of Subcontractors (if any)

General contractors and subcontractors:
- Any additions and/or deletions to the list of subcontractors working on a project must be submitted to the Department within 30 days of occurrence.
- If an extension is needed for a project, please contact the Department of Revenue at the address, number, or email listed below. Extension requests should be submitted no more than 30 days after expiration date.
- Subcontractors Project Start Date should be the date they will begin working on the project and ordering materials

THERE IS A FILING REQUIREMENT IF YOUR APPLICATION IS APPROVED. The return will be filed through the Consumer's Use Tax account. Please see the following page for detailed instructions and general information regarding the reporting requirements.

The application and required documentation may be mailed, faxed, or emailed to the following:

Fax: (334) 353-7867

Email: STExemptionUnit@revenue.alabama.gov

Mailing Address: ATTN: Contractor's Exemption
Alabama Department of Revenue
Sales & Use Tax Division
Room 4303
PO Box 327710
Montgomery, AL 36132-7710

JULIE P. MAGEE
Commissioner

State of Alabama
Department of Revenue
(www.revenue.alabama.gov)
50 North Ripley Street
Montgomery, Alabama 36132

MICHAEL E. MASON
Assistant Commissioner
JOE W. GARRETT, JR.
Deputy Commissioner
CURTIS E. STEWART
Deputy Commissioner

Alabama Department of Revenue
NOTICE

Tax Guidance for Contractors, Subcontractors and Alabama Governmental Entities Regarding Construction-related Contracts

Legislative Act 2013-205 requires the Department of Revenue to issue Form STC-1, *Sales and Use Tax Certificate of Exemption for Government Entity Projects*, to all contractors and subcontractors working on qualifying governmental entity projects once the Form ST: EXC-01 is approved.

Each exempt entity, contractor and subcontractor must make application for qualification of the exemption using Form ST: EXC-01 for each tax-exempt project. The application is available on the department's website at http://revenue.alabama.gov/salestax/ST-EXC-01.pdf. Applications should be submitted directly to the Sales and Use Tax Division Central Office, P.O Box 327710, Montgomery, AL 36132-7710.

The sales and use tax exemption provided for in Act 2013-205 applies to the purchase of building materials, construction materials and supplies, and other tangible personal property that become part of the structure pursuant to a qualifying contract entered into on or after January 1, 2014. Qualifying projects and contracts are those generally entered into with the following governmental entities, unless otherwise noted: the State of Alabama, a county or incorporated municipality of Alabama, an Alabama public school, or an Alabama industrial or economic development board or authority already exempt from sales and use taxes. **Please note that contracts entered into with the federal government and contracts pertaining to highway, road, or bridge construction or repair do not qualify for the exemption provided for in Act 2013-205**. [Reference: Sales and Use Tax Division Administrative Rule 810-6-3-.77 *Exemption for Certain Purchases by Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Governmental Entities.*]

The Alabama Department of Revenue will assign each contractor and sub-contractor a consumers use tax account, if one is currently not in place, at the time the Form STC-1, Sales *and Use Tax Certificate of Exemption for Government Entity Projects*, is issued.

Contractors and sub-contractors for qualifying projects will be required to file monthly consumers use tax returns and report all exempt purchases for ongoing projects, as well as all taxable purchases on one return. These returns are required to be filed through the department's online tax return filing and payment portal, My Alabama Taxes (https://myalabamataxes.alabama.gov).

As another option for these types of contracts, as well as with other contracts entered into with other types of exempt entities, the Form ST:PAA1, *Purchasing Agent Appointment*, may be used. However, please be advised that the use of the Form ST:PAA1 option will require the exempt entity to be invoiced directly and pay for directly from their funds any construction and building material and supply purchases.

For additional information concerning this guidance, taxpayers should contact Sales and Use Tax Division representative Thomas Sims at 334-242-1574 or by email at Thomas.Sims@revenue.alabama.gov.

ATTACHMENT "A"
TO PROPOSAL FORM

GENERAL CONTRACTOR _____

UNIT PRICES: The undersigned proposes the following Unit Prices for additions to or deductions from the Work wherein Unit Prices are applicable as determined by the Architect and Owner. These Unit Prices include all charges for labor and materials, fees, layout, supervision (field and home office), general expenses, taxes, insurance, overhead and profit, for Unit Item of Work in place. The Contract Sum shall be increased or decreased based upon quantity difference multiplied by the applicable Unit Price, in accordance with the General Conditions of the Construction Contract.

Refer to Section 01 2200 – Unit Prices and the respective item Specification Section for the complete Unit Price item description, quantities, units, and measurement thereof.

Submit the following Unit Prices with the Proposal Form on Bid Date.

	UNIT PRICE ITEM	UNIT OF MEASURE	QUANTITY	UNIT PRICE
A	30A BUSWAY CONNECTIONS	EA	10	$_____
B	60A BUSWAY CONNECTIONS	EA	10	$_____
C	UNDERCUT AND BACKFILL IN BUILDING CONTROL AREA	CY	250	$_____
D	UNDERCUT AND BACKFILL IN PAVEMENT CONTROL AREA	CY	250	$_____
E	ASPHALT PAVEMENT - FULL DEPTH	SY	500	$_____

Unit Abbreviations: Each Item (EA), Ton (TN), Cubic Yard (CY), Square Yard (SY), Cubic Foot (CF), Square Foot (SF), Linear Foot (LF), Acre (AC).

SIGNED this _____ day of _____, 2026.

CONTRACTOR

_____
(Contractor Company Name)

By:

_____
_____
(Signee's Printed Name and Title)

ATTACHMENT "B"
TO PROPOSAL FORM

GENERAL CONTRACTOR _____

SUB-CONTRACTOR LISTING: Submit the following Subcontractor's company names with the Proposal Form NO LATER THAN 2:00 PM local time on Bid Date, or at the Contractor's option, deliver to Owner with copy to Architect within twenty-four (24) hours of the scheduled Bid Opening.

02 4100 – DEMOLITION	Firm Name: _____ Location (City/ State): _____
03 3000 – CAST IN PLACE CONCRETE	Firm Name: _____ Location (City/ State): _____
03 3660 – USER-SEALED CONCRETE FLOOR	Firm Name: _____ Location (City/ State): _____
03 3680 – CONCRETE POLISHING	Firm Name: _____ Location (City/ State): _____
04 2000 – UNIT MASONRY	Firm Name: _____ Location (City/ State): _____
05 1200 – STRUCTURAL STEEL	Firm Name: _____ Location (City/ State): _____

05 4000 – COLD-FORMED METAL FRAMING	Firm Name: _____ Location (City/ State): _____
05 5000 – METAL FABRICATIONS	Firm Name: _____ Location (City/ State): _____
06 1000 – ROUGH CARPENTRY	Firm Name: _____ Location (City/ State): _____
06 2000 – FINISH CARPENTRY	Firm Name: _____ Location (City/ State): _____
06 4000 – ARCHITECTURAL WOODWORK	Firm Name: _____ Location (City/ State): _____
06 8316 – FIBERGLASS REINFORCED PANELING	Firm Name: _____ Location (City/ State): _____
07 0553 – FIRE AND SMOKE ASSEMBLY IDENTIFICATION	Firm Name: _____ Location (City/ State): _____

07 1300 – SHEET WATERPROOFING	Firm Name: _____ Location (City/ State): _____
07 1400 – FLUID-APPLIED WATERPROOFING	Firm Name: _____ Location (City/ State): _____
07 2100 – THERMAL INSULATION	Firm Name: _____ Location (City/ State): _____
07 2129 – SPRAYED INSULATION	Firm Name: _____ Location (City/ State): _____
07 2400 – EXTERIOR INSULATION AND FINISH SYSTEMS	Firm Name: _____ Location (City/ State): _____
07 5200 – MODIFIED BITUMINOUS MEMBRANE ROOFING	Firm Name: _____ Location (City/ State): _____
07 6200 – SHEET METAL FLASHING AND TRIM	Firm Name: _____ Location (City/ State): _____

07 7100 – ROOF SPECIALTIES	Firm Name: _____ Location (City/ State): _____
07 7200 – ROOF ACCESSORIES	Firm Name: _____ Location (City/ State): _____
07 8400 – FIRESTOPPING	Firm Name: _____ Location (City/ State): _____
07 9010 – JOINT SEALERS	Firm Name: _____ Location (City/ State): _____
07 9100 – PREFORMED JOINT SEALS	Firm Name: _____ Location (City/ State): _____
07 9513 – EXPANSION JOINT COVER ASSEMBLIES	Firm Name: _____ Location (City/ State): _____
08 1113 – STEEL DOORS AND FRAMES	Firm Name: _____ Location (City/ State): _____

08 7100 – DOOR HARDWARE	Firm Name: _____ Location (City/ State): _____
08 8000 – GLAZING	Firm Name: _____ Location (City/ State): _____
08 9100 – LOUVERS	Firm Name: _____ Location (City/ State): _____
09 2116 – GYPSUM BOARD ASSEMBLIES	Firm Name: _____ Location (City/ State): _____
09 3000 – TILING	Firm Name: _____ Location (City/ State): _____
09 5100 – ACOUSTICAL CEILINGS	Firm Name: _____ Location (City/ State): _____
09 6500 – RESILIENT FLOORING	Firm Name: _____ Location (City/ State): _____

09 8400 – SOUND ABSORBING WALL AND CEILING UNITS	Firm Name: _____ Location (City/ State): _____
09 9100 – PAINTING	Firm Name: _____ Location (City/ State): _____
09 9600 – HIGH PERFORMANCE COATINGS	Firm Name: _____ Location (City/ State): _____
10 1100 – VISUAL DISPLAY UNITS	Firm Name: _____ Location (City/ State): _____
10 1400 - SIGNAGE	Firm Name: _____ Location (City/ State): _____
10 2800 – TOILET, BATH, AND LAUNDRY ACCESSORIES	Firm Name: _____ Location (City/ State): _____
10 4300 – EMERGENCY AID AND SECURITY SPECIALTIES	Firm Name: _____ Location (City/ State): _____

10 4400 – FIRE PROTECTION SPECIALTIES	Firm Name: _____ Location (City/ State): _____
10 5100 – LOCKERS	Firm Name: _____ Location (City/ State): _____
10 7316 – METAL CANOPIES	Firm Name: _____ Location (City/ State): _____
12 2414 – ROLLER WINDOW SHADES	Firm Name: _____ Location (City/ State): _____
12 3219 – LAMINATE CASEWORK	Firm Name: _____ Location (City/ State): _____
DIVISION 22 – PLUMBING	Firm Name: _____ Location (City/ State): _____
DIVISION 23 – HVAC	Firm Name: _____ Location (City/ State): _____

DIVISION 26 – ELECTRICAL	Firm Name: _____ Location (City/ State): _____
DIVISION 27 – COMMUNITIES	Firm Name: _____ Location (City/ State): _____
DIVISION 28 – ELECTRONIC SAFETY AND SECURITY	Firm Name: _____ Location (City/ State): _____
DIVISION 31 – EARTHWORK	Firm Name: _____ Location (City/ State): _____
31 3116 – TERMITE CONTROL	Firm Name: _____ Location (City/ State): _____
32 1216 – ASPHALT PAVING	Firm Name: _____ Location (City/ State): _____
32 1313 – CONCRETE PAVING	Firm Name: _____ Location (City/ State): _____

32 1613 – CURBS & GUTTERS	Firm Name: _____ Location (City/ State): _____
32 1723 – PAVEMENT MARKING	Firm Name: _____ Location (City/ State): _____
32 9100 – PLANTING SOILS AND PREPARATION	Firm Name: _____ Location (City/ State): _____
32 9300 – PLANTS	Firm Name: _____ Location (City/ State): _____
33 1000 – WATER UTILITIES	Firm Name: _____ Location (City/ State): _____
33 3000 – SANITARY SEWERAGE UTILITIES	Firm Name: _____ Location (City/ State): _____
33 4001 – STORM DRAINAGE	Firm Name: _____ Location (City/ State): _____
***** OTHER PRIMARY SUBCONTRACTORS NOT LISTED ABOVE *****	

	Firm Name: _____ Location (City/ State): _____
	Firm Name: _____ Location (City/ State): _____
	Firm Name: _____ Location (City/ State): _____
	Firm Name: _____ Location (City/ State): _____
	Firm Name: _____ Location (City/ State): _____
	Firm Name: _____ Location (City/ State): _____
	Firm Name: _____ Location (City/ State): _____

SECTION 00 4000.08
ALABAMA E-VERIFY GUIDANCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. ALABAMA IMMIGRATION INFORMATION CENTER GUIDANCE AND FORMS follow herein and are available at www.immigration.alabama.gov/eVerify.

1.02 LISTED DOCUMENTS

A. E-Verify Memorandum of Understanding.

B. Business Entity Employer Contractor Compliance Form.

C. Subcontractor to be given to Contractor Compliance Form.

END OF SECTION

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THE E-VERIFY PROGRAM FOR EMPLOYMENT VERIFICATION MEMORANDUM OF UNDERSTANDING FOR EMPLOYERS USING A E-VERIFY EMPLOYER AGENT

ARTICLE I

PURPOSE AND AUTHORITY

This Memorandum of Understanding (MOU) sets forth the points of agreement between the Department of Homeland Security (DHS), _____(Employer), and _____ (E-Verify Employer Agent) regarding the Employer's and E-Verify Employer Agent's participation in the Employment Eligibility Verification Program (E-Verify). This MOU explains certain features of the E-Verify program and enumerates specific responsibilities of DHS, the Social Security Administration (SSA), the Employer, and the E-Verify Employer Agent. References to the Employer include the E-Verify Employer Agent when acting on behalf of the Employer. E-Verify is a program that electronically confirms an employee's eligibility to work in the United States after completion of the Employment Eligibility Verification Form (Form I-9). For covered government contractors, E-Verify is used to verify the employment eligibility of all newly hired employees and all existing employees assigned to Federal contracts or to verify the entire workforce if the contractor so chooses.

Authority for the E-Verify program is found in Title IV, Subtitle A, of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), Pub. L. 104-208, 110 Stat. 3009, as amended (8 U.S.C. § 1324a note). Authority for use of the E-Verify program by Federal contractors and subcontractors covered by the terms of Subpart 22.18, "Employment Eligibility Verification", of the Federal Acquisition Regulation (FAR) (hereinafter referred to in this MOU as a "Federal contractor with the FAR E-Verify clause") to verify the employment eligibility of certain employees working on Federal contracts is also found in Subpart 22.18 and in Executive Order 12989, as amended.

ARTICLE II

FUNCTIONS TO BE PERFORMED

A. RESPONSIBILITIES OF SSA

1. SSA agrees to provide the Employer (through the E-Verify Employer Agent) with available information that will allow the Employer to confirm the accuracy of Social Security Numbers provided by all employees verified under this MOU and the employment authorization of U.S. citizens.

2. SSA agrees to provide the Employer and E-Verify Employer Agent appropriate assistance with operational problems that may arise during the Employer's participation in E-Verify. SSA agrees to provide the E-Verify Employer Agent with names, titles, addresses, and telephone numbers of SSA representatives to be contacted during the E-Verify process.

3. SSA agrees to safeguard the information provided by the Employer through the E-Verify program procedures, and to limit access to such information, as appropriate by law, to individuals responsible for the verification of Social Security Numbers and for

evaluation of E-Verify or such other persons or entities who may be authorized by SSA as governed by the Privacy Act (5 U.S.C. § 552a), the Social Security Act (42 U.S.C. 1306(a)), and SSA regulations (20 CFR Part 401).

4. SSA agrees to provide a means of automated verification that is designed (in conjunction with DHS's automated system if necessary) to provide confirmation or tentative nonconfirmation of U.S. citizens' employment eligibility within 3 Federal Government work days of the initial inquiry.

5. SSA agrees to provide a means of secondary verification (including updating SSA records as may be necessary) for employees who contest SSA tentative nonconfirmations that is designed to provide final confirmation or nonconfirmation of U.S. citizens' employment eligibility and accuracy of SSA records for both citizens and non-citizens within 10 Federal Government work days of the date of referral to SSA, unless SSA determines that more than 10 days may be necessary. In such cases, SSA will provide additional verification instructions.

B. RESPONSIBILITIES OF DHS

1. After SSA verifies the accuracy of SSA records for employees through E-Verify, DHS agrees to provide the Employer (through the E-Verify Employer Agent) access to selected data from DHS's database to enable the Employer (through the E-Verify Employer Agent) to conduct, to the extent authorized by this MOU:

- Automated verification checks on employees by electronic means, and
- Photo verification checks (when available) on employees.

2. DHS agrees to provide to the Employer and E-Verify Employer Agent appropriate assistance with operational problems that may arise during the Employer's participation in E-Verify. DHS agrees to provide the E-Verify Employer Agent names, titles, addresses, and telephone numbers of DHS representatives to be contacted during the E-Verify process.

3. DHS agrees to make available to the Employer (through the E-Verify Employer Agent), at the E-Verify Web site and on the E-Verify Web browser, instructional materials on E-Verify policies, procedures and requirements for both SSA and DHS, including restrictions on the use of E-Verify. DHS agrees to provide training materials on E-Verify.

4. DHS agrees to provide to the Employer (through the E-Verify Employer Agent) a notice, which indicates the Employer's participation in the E-Verify program. DHS also agrees to provide to the Employer (through the E-Verify Employer Agent) anti-discrimination notices issued by the Office of Special Counsel for Immigration-Related Unfair Employment Practices (OSC), Civil Rights Division, U.S. Department of Justice.

5. DHS agrees to issue the E-Verify Employer Agent a user identification number and password that will be used exclusively by the E-Verify Employer Agent, on behalf of the Employer, to verify information provided by employees with DHS's databases.

6. DHS agrees to safeguard the information provided to DHS by the Employer (through the E-Verify Employer Agent), and to limit access to such information to individuals responsible for the verification of employees' employment eligibility and for evaluation of the E-Verify program, or to such other persons or entities as may be authorized by applicable law. Information will be used only to verify the accuracy of Social Security Numbers and employment eligibility, to enforce the Immigration and Nationality Act (INA) and Federal criminal laws, and to administer Federal contracting requirements.

7. DHS agrees to provide a means of automated verification that is designed (in conjunction with SSA verification procedures) to provide confirmation or tentative nonconfirmation of employees' employment eligibility within 3 Federal Government workdays of the initial inquiry.

8. DHS agrees to provide a means of secondary verification (including updating DHS records as may be necessary) for employees who contest DHS tentative nonconfirmations and photo non-match tentative nonconfirmations that is designed to provide final confirmation or nonconfirmation of the employees' employment eligibility within 10 Federal Government work days of the date of referral to DHS, unless DHS determines that more than 10 days may be necessary. In such cases, DHS will provide additional verification instructions.

C. RESPONSIBILITIES OF THE EMPLOYER

1. The Employer agrees to display the notices supplied by DHS (through the E-Verify Employer Agent) in a prominent place that is clearly visible to prospective employees and all employees who are to be verified through the system.

2. The Employer agrees to provide to the SSA and DHS the names, titles, addresses, and telephone numbers of the Employer representatives to be contacted regarding E-Verify.

3. The Employer agrees to become familiar with and comply with the most recent version of the E-Verify User Manual. The Employer will obtain the E-Verify User Manual from the E-Verify Employer Agent.

4. The Employer agrees to comply with current Form I-9 procedures, with two exceptions:

   - If an employee presents a "List B" identity document, the Employer agrees to only accept "List B" documents that contain a photo. (List B documents identified in 8 C.F.R. § 274a.2(b)(1)(B)) can be presented during the Form I-9 process to establish identity.) If an employee objects to the photo requirement for religious reasons, the Employer should contact E-Verify at 1-888-464-4218.

   - If an employee presents a DHS Form I-551 (Permanent Resident Card) or Form I-766 (Employment Authorization Document) to complete the Form I-9, the Employer agrees to make a photocopy of the document and to retain the photocopy with the employee's Form I-9. The photocopy must be of sufficient quality to allow for verification of the photo and written information. The employer will use the photocopy to verify the photo and to assist DHS with its review of photo non-matches that are contested by employees. Note that employees

retain the right to present any List A, or List B and List C, documentation to complete the Form I-9. DHS may in the future designate other documents that activate the photo screening tool.

5. The Employer understands that participation in E-Verify does not exempt the Employer from the responsibility to complete, retain, and make available for inspection Forms I-9 that relate to its employees, or from other requirements of applicable regulations or laws, including the obligation to comply with the antidiscrimination requirements of section 274B of the INA with respect to Form I-9 procedures, except for the following modified requirements applicable by reason of the Employer's participation in E-Verify: (1) identity documents must have photos, as described in paragraph 4 above; (2) a rebuttable presumption is established that the Employer has not violated section 274A(a)(1)(A) of the Immigration and Nationality Act (INA) with respect to the hiring of any individual if it obtains confirmation of the identity and employment eligibility of the individual in good faith compliance with the terms and conditions of E-Verify; (3) the Employer must notify DHS if it continues to employ any employee after receiving a final nonconfirmation, and is subject to a civil money penalty between $550 and $1,100 for each failure to notify DHS of continued employment following a final nonconfirmation; (4) the Employer is subject to a rebuttable presumption that it has knowingly employed an unauthorized alien in violation of section 274A(a)(1)(A) if the Employer continues to employ an employee after receiving a final nonconfirmation; and (5) no person or entity participating in E-Verify is civilly or criminally liable under any law for any action taken in good faith based on information provided through the confirmation system. DHS reserves the right to conduct Form I-9 and E-Verify system compliance inspections during the course of E-Verify, as well as to conduct any other enforcement activity authorized by law.

6. The Employer agrees to initiate E-Verify verification procedures (through the E-Verify Employer Agent), for new employees within 3 Employer business days after each employee has been hired (but after both sections 1 and 2 of the Form I-9 have been completed), and to complete as many (but only as many) steps of the E-Verify process as are necessary according to the E-Verify User Manual, or in the case of Federal contractors with the FAR E-Verify clause, the E-Verify User Manual for Federal Contractors. The Employer is prohibited from initiating verification procedures before the employee has been hired and the Form I-9 completed. If the automated system to be queried is temporarily unavailable, the 3-day time period is extended until it is again operational in order to accommodate the Employer's attempting, in good faith, to make inquiries during the period of unavailability. Employers may initiate verification, through the E-Verify Employer Agent, by notating the Form I-9 in circumstances where the employee has applied for a Social Security Number (SSN) from the SSA and is waiting to receive the SSN, provided that the Employer (through the E-Verify Employer Agent) performs an E-Verify employment verification query using the employee's SSN as soon as the SSN becomes available.

7. The Employer agrees not to use E-Verify procedures for pre-employment screening of job applicants, in support of any unlawful employment practice, or for any other use not authorized by this MOU. Employers must use E-Verify (through its E-Verify Employer Agent) for all new employees, unless an Employer is a Federal contractor that qualifies for the exceptions described in Article II.D.1.c. Except as provided in

Article II.D, the Employer will not verify selectively and will not verify employees hired before the effective date of this MOU. The Employer understands that if the Employer uses the E-Verify system for any purpose other than as authorized by this MOU, the Employer may be subject to appropriate legal action and termination of its access to SSA and DHS information pursuant to this MOU.

8. The Employer (through its E-Verify Employer Agent) agrees to follow appropriate procedures (see Article III. below) regarding tentative nonconfirmations, including notifying employees in private of the finding and providing them written notice of the findings, providing written referral instructions to employees, allowing employees to contest the finding, and not taking adverse action against employees if they choose to contest the finding. Further, when employees contest a tentative nonconfirmation based upon a photo non-match, the Employer is required to take affirmative steps (see Article III.B. below) to contact DHS with information necessary to resolve the challenge.

9. The Employer agrees not to take any adverse action against an employee based upon the employee's perceived employment eligibility status while SSA or DHS is processing the verification request unless the Employer obtains knowledge (as defined in 8 C.F.R. § 274a.1(l)) that the employee is not work authorized. The Employer understands that an initial inability of the SSA or DHS automated verification system to verify work authorization, a tentative nonconfirmation, a case in continuance (indicating the need for additional time for the government to resolve a case), or the finding of a photo non-match, does not establish, and should not be interpreted as evidence, that the employee is not work authorized. In any of the cases listed above, the employee must be provided a full and fair opportunity to contest the finding, and if he or she does so, the employee may not be terminated or suffer any adverse employment consequences based upon the employee's perceived employment eligibility status (including denying, reducing, or extending work hours, delaying or preventing training, requiring an employee to work in poorer conditions, refusing to assign the employee to a Federal contract or other assignment, or otherwise subjecting an employee to any assumption that he or she is unauthorized to work, or otherwise mistreating an employee) until and unless secondary verification by SSA or DHS has been completed and a final nonconfirmation has been issued. If the employee does not choose to contest a tentative nonconfirmation or a photo non-match or if a secondary verification is completed and a final nonconfirmation is issued, then the Employer can find the employee is not work authorized and terminate the employee's employment. Employers or employees with questions about a final nonconfirmation may call E-Verify at 1-888-464-4218 or OSC at 1-800-255-8155 or 1-800-237-2515 (TDD).

10. The Employer agrees to comply with Title VII of the Civil Rights Act of 1964 and section 274B of the INA, as applicable, by not discriminating unlawfully against any individual in hiring, firing, or recruitment or referral practices because of his or her national origin or, in the case of a protected individual as defined in section 274B(a)(3) of the INA, because of his or her citizenship status. The Employer understands that such illegal practices can include selective verification or use of E-Verify except as provided in part D below, or discharging or refusing to hire employees because they appear or sound "foreign" or have received tentative nonconfirmations. The Employer further understands that any violation of the unfair

immigration-related employment practices provisions in section 274B of the INA could subject the Employer to civil penalties, back pay awards, and other sanctions, and violations of Title VII could subject the Employer to back pay awards, compensatory and punitive damages. Violations of either section 274B of the INA or Title VII may also lead to the termination of its participation in E-Verify. If the Employer has any questions relating to the anti-discrimination provision, it should contact OSC at 1-800-255-8155 or 1-800-237-2515 (TDD).

11. The Employer agrees to record the case verification number on the employee's Form I-9 or to print the screen containing the case verification number and attach it to the employee's Form I-9.

12. The Employer agrees that it will use the information it receives from SSA or DHS (through the E-Verify Employer Agent) pursuant to E-Verify and this MOU only to confirm the employment eligibility of employees as authorized by this MOU. The Employer agrees that it will safeguard this information, and means of access to it (such as PINS and passwords) to ensure that it is not used for any other purpose and as necessary to protect its confidentiality, including ensuring that it is not disseminated to any person other than employees of the Employer who are authorized to perform the Employer's responsibilities under this MOU, except for such dissemination as may be authorized in advance by SSA or DHS for legitimate purposes.

13. The Employer acknowledges that the information which it receives through the E-Verify Employer Agent from SSA is governed by the Privacy Act (5 U.S.C. § 552a(i)(1) and (3)) and the Social Security Act (42 U.S.C. 1306(a)), and that any person who obtains this information under false pretenses or uses it for any purpose other than as provided for in this MOU may be subject to criminal penalties.

14. The Employer agrees to cooperate with DHS and SSA in their compliance monitoring and evaluation of E-Verify, including by permitting DHS and SSA, upon reasonable notice, to review Forms I-9 and other employment records and to interview it and its employees regarding the Employer's use of E-Verify, and to respond in a timely and accurate manner to DHS requests for information relating to their participation in E-Verify.

D. RESPONSIBILITIES OF FEDERAL CONTRACTORS WITH THE FAR E-VERIFY CLAUSE

1. The Employer understands that if it is a Federal contractor subject to the employment verification terms in Subpart 22.18 of the FAR it must verify the employment eligibility of any existing employee assigned to the contract and all new hires, as discussed in the Supplemental Guide for Federal Contractors. Once an employee has been verified through E-Verify by the Employer, the Employer may not reverify the employee through E-Verify.

    a. Federal contractors with the FAR E-Verify clause agree to become familiar with and comply with the most recent versions of the E-Verify User Manual for Federal Contractors and the E-Verify Supplemental Guide for Federal Contractors.

b. Federal contractors with the FAR E-Verify clause agree to complete a tutorial for Federal contractors with the FAR E-Verify clause.

c. Federal contractors with the FAR E-Verify clause not enrolled at the time of contract award: An Employer that is not enrolled in E-Verify as a Federal contractor at the time of a contract award must enroll as a Federal contractor with the FAR E-Verify clause in E-Verify within 30 calendar days of contract award and, within 90 days of enrollment, begin to use E-Verify to initiate verification of employment eligibility of new hires of the Employer who are working in the United States, whether or not assigned to the contract. Once the Employer begins verifying new hires, such verification of new hires must be initiated within 3 business days after the date of hire. Once enrolled in E-Verify as a Federal contractor with the FAR E-Verify clause, the Employer must initiate verification of employees assigned to the contract within 90 calendar days from the time of enrollment in the system and then selecting which employees will be verified in E-Verify or within 30 days of an employee's assignment to the contract, whichever date is later.

d. Employer that are already enrolled in E-Verify at the time of a contract award but are not enrolled in the system as a Federal contractor with the FAR E-Verify clause: Employers enrolled in E-Verify as a Federal contractor for 90 days or more at the time of a contract award must use E-Verify to initiate verification of employment eligibility for new hires of the Employer who are working in the United States, whether or not assigned to the contract, within 3 business days after the date of hire. Employers enrolled in E-Verify as other than a Federal contractor with the FAR E-Verify clause, must update E-Verify to indicate that they are a Federal contractor with the FAR E-Verify clause within 30 days after assignment to the contract. If the Employer is enrolled in E-Verify for 90 calendar days or less at the time of contract award, the Employer must, within 90 days of enrollment, begin to use E-Verify to initiate verification of new hires of the contractor who are working in the United States, whether or not assigned to the contract. Such verification of new hires must be initiated within 3 business days after the date of hire. An Employer enrolled as a Federal contractor with the FAR E-Verify clause in E-Verify must initiate verification of each employee assigned to the contract within 90 calendar days after date of contract award or within 30 days after assignment to the contract, whichever is later.

e. Institutions of higher education, State, local and tribal governments and sureties: Federal contractors with the FAR E-Verify clause that are institutions of higher education (as defined at 20 U.S.C. 1001(a)), State or local governments, governments of Federally recognized Indian tribes, or sureties performing under a takeover agreement entered into with a Federal agency pursuant to a performance bond may choose to only verify new and existing employees assigned to the Federal contract. Such Federal contractors with the FAR E-Verify clause may, however, elect to verify all new hires, and/or all existing employees hired after November 6, 1986. The provisions of Article II, part D, paragraphs 1.a and 1.b of this MOU providing timeframes for initiating employment verification of employees assigned to a

contract apply to such institutions of higher education, State, local , tribal governments, and sureties.

f. Verification of all employees: Upon enrollment, Employers who are Federal contractors with the FAR E-Verify clause may elect to verify employment eligibility of all existing employees working in the United States who were hired after November 6, 1986, instead of verifying only new employees and those existing employees assigned to a covered Federal contract. After enrollment, Employers must elect to do so only in the manner designated by DHS and initiate E-Verify verification of all existing employees within 180 days after the election.

g. Form I-9 procedures for existing employees of Federal contractors with the FAR E-Verify clause: Federal contractors with the FAR E-Verify clause (through their E-Verify Employer Agent) may choose to complete new Forms I-9 for all existing employees other than those that are completely exempt from this process. Federal contractors with the FAR E-Verify clause may also update previously completed Forms I-9 to initiate E-Verify verification of existing employees who are not completely exempt as long as that Form I-9 is complete (including the SSN), complies with Article II.C.4, the employee's work authorization has not expired, and the Employer has reviewed the information reflected in the Form I-9 either in person or in communications with the employee to ensure that the employee's stated basis in section 1 of the Form I-9 for work authorization has not changed (including, but not limited to, a lawful permanent resident alien having become a naturalized U.S. citizen). If the Employer is unable to determine that the Form I-9 complies with Article II.C.4, if the employee's basis for work authorization as attested in section 1 has expired or changed, or if the Form I-9 contains no SSN or is otherwise incomplete, the Employer shall complete a new I-9 consistent with Article II.C.4, or update the previous I-9 to provide the necessary information. If section 1 of the Form I-9 is otherwise valid and up-to-date and the form otherwise complies with Article II.C.4, but reflects documentation (such as a U.S. passport or Form I-551) that expired subsequent to completion of the Form I-9, the Employer shall not require the production of additional documentation, or use the photo screening tool described in Article II.C.4, subject to any additional or superseding instructions that may be provided on this subject in the Supplemental Guide for Federal Contractors. Nothing in this section shall be construed to require a second verification using E-Verify of any assigned employee who has previously been verified as a newly hired employee under this MOU, or to authorize verification of any existing employee by any Employer that is not a Federal contractor with the FAR E-Verify clause.

2. The Employer understands that if it is a Federal contractor with the FAR E-Verify clause, its compliance with this MOU is a performance requirement under the terms of the Federal contract or subcontract, and the Employer consents to the release of information relating to compliance with its verification responsibilities under this MOU to contracting officers or other officials authorized to review the Employer's compliance with Federal contracting requirements.

E. RESPONSIBILITIES OF THE E-VERIFY EMPLOYER AGENT

1. The E-Verify Employer Agent agrees to provide to the SSA and DHS the names, titles, addresses, and telephone numbers of the E-Verify Employer Agent representatives who will be accessing information under E-Verify.

2. The E-Verify Employer Agent agrees to become familiar with and comply with the E-Verify User Manual and provide a copy of the manual to the Employer so that the Employer can become familiar with and comply with E-Verify policy and procedures.

3. The E-Verify Employer Agent agrees that any E-Verify Employer Agent Representative who will perform employment verification queries will complete the E-Verify Tutorial before that individual initiates any queries.

    a. The E-Verify Employer Agent agrees that all E-Verify Employer Agent representatives will take the refresher tutorials initiated by the E-Verify program as a condition of continued use of E-Verify, including any tutorials for Federal contractors if the Employer is a Federal contractor.

    b. Failure to complete a refresher tutorial will prevent the E-Verify Employer Agent and Employer from continued use of the program.

4. The E-Verify Employer Agent agrees to obtain the necessary equipment to utilize E-Verify.

5. The E-Verify Employer Agent agrees to provide the Employer with the notices described in Article II.B.4 above.

6. The E-Verify Employer Agent agrees to initiate E-Verify procedures on behalf of the Employer in accordance with the E-Verify Manual and E-Verify Web-Based Tutorial. The E-Verify Employer Agent will query the automated system using information provided by the Employer and will immediately communicate the response back to the Employer. If the automated system to be queried is temporarily unavailable, the 3-day time period is extended until it is again operational in order to accommodate the E-Verify Employer Agent's attempting, in good faith, to make inquiries on behalf of the Employer during the period of unavailability. In all cases, the E-Verify Employer Agent will use the SSA verification procedures first, and will use DHS verification procedures only as directed by the SSA verification response.

7. The E-Verify Employer Agent agrees to cooperate with DHS and SSA in their compliance monitoring and evaluation of E-Verify, including by permitting DHS and SSA, upon reasonable notice, to review Forms I-9 and other employment records and to interview it and its employees regarding the use of E-Verify, and to respond in a timely and accurate manner to DHS requests for information relating to their participation in E-Verify.

ARTICLE III

REFERRAL OF INDIVIDUALS TO SSA AND DHS

A. REFERRAL TO SSA

1. If the Employer receives a tentative nonconfirmation issued by SSA, the Employer must print the tentative nonconfirmation notice as directed by the automated system and provide it to the employee so that the employee may determine whether he or she will contest the tentative nonconfirmation.

2. The Employer will refer employees to SSA field offices only as directed by the automated system based on a tentative nonconfirmation, and only after the Employer records the case verification number, reviews the input to detect any transaction errors, and determines that the employee contests the tentative nonconfirmation. The Employer (through the E-Verify Employer Agent), will transmit the Social Security Number to SSA for verification again if this review indicates a need to do so. The Employer will determine whether the employee contests the tentative nonconfirmation as soon as possible after the Employer receives it.

3. If the employee contests an SSA tentative nonconfirmation, the Employer will provide the employee with a system-generated referral letter and instruct the employee to visit an SSA office within 8 Federal Government work days. SSA will electronically transmit the result of the referral to the Employer (through the E-Verify Employer Agent) within 10 Federal Government work days of the referral unless it determines that more than 10 days is necessary. The Employer agrees to check the E-Verify system regularly for case updates.

4. The Employer agrees not to ask the employee to obtain a printout from the Social Security Number database (the Numident) or other written verification of the Social Security Number from the SSA.

B. REFERRAL TO DHS

1. If the Employer receives a tentative nonconfirmation issued by DHS, the Employer must print the tentative nonconfirmation notice as directed by the automated system and provide it to the employee so that the employee may determine whether he or she will contest the tentative nonconfirmation.

2. If the Employer finds a photo non-match for an employee who provides a document for which the automated system has transmitted a photo, the employer must print the photo non-match tentative nonconfirmation notice as directed by the automated system and provide it to the employee so that the employee may determine whether he or she will contest the finding.

3. The Employer agrees to refer individuals to DHS only when the employee chooses to contest a tentative nonconfirmation received from DHS automated verification process or when the Employer issues a tentative nonconfirmation based upon a photo non-match. The Employer will determine whether the employee contests the tentative nonconfirmation as soon as possible after the Employer receives it.

4. If the employee contests a tentative nonconfirmation issued by DHS, the Employer will provide the employee with a referral letter and instruct the employee to contact

DHS through its toll-free hotline (as found on the referral letter) within 8 Federal Government work days.

5. If the employee contests a tentative nonconfirmation based upon a photo non-match, the Employer will provide the employee with a referral letter to DHS. DHS will electronically transmit the result of the referral to the Employer within 10 Federal Government work days of the referral unless it determines that more than 10 days is necessary. The Employer agrees to check the E-Verify system regularly for case updates.

6. The Employer agrees that if an employee contests a tentative nonconfirmation based upon a photo non-match, the Employer (or the E-Verify Employer Agent) will send a copy of the employee's Form I-551 or Form I-766 to DHS for review by:
   - Scanning and uploading the document, or
   - Sending a photocopy of the document by and express mail account (pain for at employer expense).
7. If the Employer (through the E-Verify Employer Agent) determines that there is a photo non-match when comparing the photocopied List B document described in Article II.C.4 with the image generated in E-Verify, the Employer (through the E-Verify Employer Agent) must forward the employee's documentation to DHS using one of the means described in the preceding paragraph, and allow DHS to resolve the case.

ARTICLE IV

SERVICE PROVISIONS

The SSA and DHS will not charge the Employer or the E-Verify Employer Agent for verification services performed under this MOU. DHS is not responsible for providing the equipment needed to make inquiries. A personal computer with Internet access is needed to access the E-Verify System.

ARTICLE V

PARTIES

A. This MOU is effective upon the signature of all parties, and shall continue in effect for as long as the SSA and DHS conduct the E-Verify program unless modified in writing by the mutual consent of all parties, or terminated by any party upon 30 days prior written notice to the others. Any and all system enhancements to the E-Verify program by DHS or SSA, including but not limited to the E-Verify checking against additional data sources and instituting new verification procedures, will be covered under this MOU and will not cause the need for a supplemental MOU that outlines these changes. DHS agrees to train employers on all changes made to E-Verify through the use of mandatory refresher tutorials and updates to the E-Verify User Manual, the E-Verify User Manual for Federal Contractors, or the E-Verify Supplemental Guide for Federal Contractors. Even without changes to E-Verify, DHS reserves the right to require employers to take mandatory refresher tutorials. An Employer that is a Federal contractor with the FAR E-Verify clause may terminate this MOU when the Federal contract that requires its participation in E-Verify is terminated or

completed. In such a circumstance, the Federal contractor with the FAR E-Verify clause must provide written notice to DHS. If an Employer that is a Federal contractor with the FAR E-Verify clause fails to provide such notice, that Employer will remain a participant in the E-Verify program, will remain bound by the terms of this MOU that apply to participants that are not Federal contractors with the FAR E-Verify clause, and will be required to use the E-Verify procedures to verify the employment eligibility of all newly hired employees.

B. Notwithstanding Article V, part A of this MOU, DHS may terminate access to E-Verify if it is deemed necessary because of the requirements of law or policy, or upon a determination by SSA or DHS that there has been a breach of system integrity or security by the E-Verify Employer Agent or the Employer, or a failure on the part of either to comply with established procedures or legal requirements. The Employer understands that if it is a Federal contractor with the FAR E-Verify clause, termination of this MOU by any party for any reason may negatively affect the Employer's performance of its contractual responsibilities.

C. Some or all SSA and DHS responsibilities under this MOU may be performed by contractor(s), and SSA and DHS may adjust verification responsibilities between each other as they may determine necessary. By separate agreement with DHS, SSA has agreed to perform its responsibilities as described in this MOU.

D. Nothing in this MOU is intended, or should be construed, to create any right or benefit, substantive or procedural, enforceable at law by any third party against the United States, its agencies, officers, or employees, or against the E-Verify Employer Agent, the Employer, or their agents, officers, or employees.

E. Each party shall be solely responsible for defending any claim or action against it arising out of or related to E-Verify or this MOU, whether civil or criminal, and for any liability wherefrom, including (but not limited to) any dispute between the E-Verify Employer Agent or the Employer and any other person or entity regarding the applicability of Section 403(d) of IIRIRA to any action taken or allegedly taken by the E-Verify Employer Agent or the Employer.

F. Participation in E-Verify is not confidential information and may be disclosed as authorized or required by law and DHS or SSA policy, including but not limited to, Congressional oversight, E-Verify publicity and media inquiries, determinations of compliance with Federal contractual requirements, and responses to inquiries under the Freedom of Information Act (FOIA).

G. The foregoing constitutes the full agreement on this subject between DHS, the Employer and the E-Verify Employer Agent.

_____(Employer) hereby designates and appoints_____(E-Verify Employer Agent), including its officers and employees, as the E-Verify Employer Agent for the purpose of carrying out_____(Employer) responsibilities under the MOU between the Employer, the E-Verify Employer Agent, and DHS.

The individuals whose signatures appear below represent that they are authorized to enter into this MOU on behalf of the Employer, the E-Verify Employer Agent and DHS respectively.

If you have any questions, contact E-Verify at 1-888-464-4218.

SECTION 00 4000.08
ALABAMA E-VERIFY GUIDANCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. ALABAMA IMMIGRATION INFORMATION CENTER GUIDANCE AND FORMS follow herein and are available at www.immigration.alabama.gov/eVerify.

1.02 LISTED DOCUMENTS

A. E-Verify Memorandum of Understanding.

B. Business Entity Employer Contractor Compliance Form.

C. Subcontractor to be given to Contractor Compliance Form.

END OF SECTION

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FORM FOR SECTIONS 9 (a) and (b) BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT; CODE OF ALABAMA, SECTIONS 31-13-9 (a) and (b)

AFFIDAVIT FOR BUSINESS ENTITY/EMPLOYER /CONTRACTOR
(To be completed as a condition for the award of any contract, grant, or incentive by the State of Alabama, any political subdivision thereof, or any state-funded entity to a business entity or employer that employs one or more employees)

State of _____

County of _____

Before me, a notary public, personally appeared _____ (print name) who, being duly sworn, says as follows:

As a condition for the award of any contract, grant, or incentive by the State of Alabama, any political subdivision thereof, or any state-funded entity to a business entity or employer that employs one or more employees, I hereby attest that in my capacity as _____(state position) for _____ _____ (state business entity/employer/contractor name) that said business entity/employer/contractor shall not knowingly employ, hire for employment, or continue to employ an unauthorized alien.

I further attest that said business entity/employer/contractor is enrolled in the E-Verify program. (ATTACH DOCUMENTATION ESTABLISHING THAT BUSINESS ENTITY/EMPLOYER/CONTRACTOR IS ENROLLED IN THE E-VERIFY PROGRAM)

_____Signature of Affiant

Sworn to and subscribed before me this _____day of _____, 2____.

I certify that the affiant is known (or made known) to me to be the identical party he or she claims to be.

_____Signature and Seal of Notary Public

Author: Jean Brown
Statutory Authority: Code of Alabama, sections 31-13-9 (a) and (b); Section 31-13-9 (h).
History: **New Rule:** Filed December 12, 2011; effective December 12, 2011

FORM FOR SECTION 9 (d) BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT; CODE OF ALABAMA, SECTION 31-13-9 (d)

AFFIDAVIT OF DIRECT SUBCONTRACTOR TO BE GIVEN TO CONTRACTOR

State of _____

County of _____

Before me, a notary public, personally appeared _____(print name) who, being duly sworn, says as follows:

I hereby attest that as _____(state position) for the direct subcontractor _____(state business entity/employer/subcontractor name) for _____(state business entity/employer/contractor name) said direct subcontractor has not knowingly employed, hired for employment, or continued to employ an unauthorized alien. I further attest that I have verified each of the above-named direct subcontractor's employee's eligibility for employment. I further attest that I have in good faith complied with Code of Alabama, Section 31-13-9 (c)*

_____Signature of Affiant

Sworn to and subscribed before me this ____day of _____, 2_____.

I certify that the affiant is known (or made known) to me to be the identical party he or she claims to be.

_____Signature and Seal of Notary Public

*Code of Alabama, Section 31-13-9 (c) provides: "No subcontractor on a project paid for by contract, grant, or incentive by the state [of Alabama], any political subdivision thereof, or any state-funded entity shall knowingly employ, hire for employment, or continue to employ an unauthorized alien and shall attest to such by sworn affidavit signed before a notary. The subcontractor shall also enroll in the E-Verify program prior to performing any work on the project and shall attach to the sworn affidavit documentation establishing that the subcontractor is enrolled in the E-Verify program."

Author: Jean Brown
Statutory Authority: Code of Alabama, section 31-13-9 (d); Section 31-13-9 (h).

SECTION 00 5000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. For contracting, unless otherwise indicated in the contract documents, the following forms shall be used for the specified purposes.
   1. Section 00 5000.01 - ACCS Form 2.A - Construction Contract.
   2. Section 00 5000.02 - ACCS Form 2.B - General Conditions of the Contract for Construction.
   3. Section 00 5000.03 - ACCS Form 2.C - Performance Bond.
   4. Section 00 5000.04 - ACCS Form 2.D - Payment Bond.
   5. Section 00 5000.05 - ACCS Form 2.F - Contract Change Order.
   6. Section 00 5000.06 - ACCS Form 2.G - Change Order Justification.
   7. Section 00 5000.07 - State of Alabama Discolsure Statement.
   8. Section 00 5000.08 - ACCS Form 6.D - Application and Certificate for Payment
   9. Section 00 5000.09 - ACCS Form 6.E - Schedule of Values
   10. Section 00 5000.10 - ACCS Form 6.F - Schedule of Stored Materials
   11. Section 00 5000.11 - ACCS Form 6.H - Sample Progress Schedule and Report
   12. Section 00 5000.12 - ACCS Form 6.J - Certificate of Structural Observations
   13. Section 00 5000.13 - ACCS Form 6.K - Certificate of Substantial Completion
   14. Section 00 5000.14 - ACCS form 6.L - General Contractor's Roofing Guarantee
   15. Section 00 5000.15 - ACCS Form 6.M - Sample Form of Advertisement for Completion
   16. Section 00 5000.16 - ACCS form 6.N - Contractor's Affidavit of Payment of Debts and Claims
   17. Section 00 5000.17 - ACCS form 6.P - Contractor's Affidavit of release of Liens
   18. Section 00 5000.18 - ACCS Form 6.Q - Consent of Surety to Final Payment

B. See Section 00 5200 - Agreement Form for the Agreement and General Conditions.

1.03 REFERENCE STANDARDS

A. ConsensusDOCS 200 - Standard Agreement and General Conditions Between Owner and Constructor (Lump Sum Price); 2017.

B. EJCDC C-520 - Suggested Form of Agreement Between Owner & Contractor, Stipulated Price; 2018.

C. EJCDC C-700 - Standard General Conditions of the Construction Contract; 2018.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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FACILITIES DIVISION

ACCS FORM 2-A

CONSTRUCTION CONTRACT

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

1 **ACCS PROJECT#:**	

2 This Construction Contract is entered into this **31st** day of **<month>** in the year of **<year>**
3 between the **OWNER**, the Alabama Community College System on behalf of:

<Select Client>

Address:			
Email:		Phone:	

4 and the **CONTRACTOR,**

Company Name:			
Address:			
Email:		Phone:	

5 for the **WORK** of the Project identified as:

6 The **CONTRACT DOCUMENTS** are dated and have been amended by
7 **ADDENDA:**

Review/Initial of Regional Facilities Director _____

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 (ACCS Form 2-B), 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 Chief Facilities Officer, ACCS Facilities Division, 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

13 **SPECIAL PROVISIONS:** (Special Provisions may be inserted here, such as acceptance or rejection of unit prices. If Special Provisions are continued in an attachment, identify the attachment below).

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.:		Expiration Date	
Bid Limit:		Classifications	

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 No. 26.

15

APPROVALS

LOCAL COLLEGE OR TRADE SCHOOL

BY: _____

AS PRESIDENT OF

<Select Client>

ALABAMA COMMUNITY COLLEGE SYSTEM (ACCS)

BY: _____ DATE: _____

CHIEF FACILITIES OFFICER

CONTRACTING PARTIES

_____

CONTRACTOR COMPANY

BY: _____

SIGNATURE

NAME: _____

TITLE: _____

ALABAMA COMMUNITY COLLEGE SYSTEM
(AS OWNER)

BY: _____

CHANCELLOR

ATTACHMENTS:

- ☐ Copy of Alabama General Contractor's License
- ☐ Proposal Form **(ACCS Form 5-E)**
- ☐ List of all proposed major subcontractors and suppliers
- ☐ Accounting of Sales Tax **(ACCS Form 5-H)**
- ☐ Bid Tabulation
- ☐ Schedule of Values
- ☐ Certificate of Liability Insurance
- ☐ **Performance Bond (ACCS Form 2-C)**
- ☐ **Payment Bond (ACCS Form 2-D)**
- ☐ State of Alabama Disclosure Statement
- ☐ E-Verify Memorandum of Understanding
- ☐ **W-9** (Request for Taxpayer Identification Number and Certificate)

Review/Initial of Regional Facilities Director _____

FACILITIES DIVISION

ACCS FORM 2-B

GENERAL CONDITIONS *of the* CONTRACT

CONTENTS

1. Definitions
2. Intent and Interpretation of the Contract Documents
3. Contractor's Representation
4. Documents Furnished to Contractor
5. Ownership of Drawings
6. Supervision, Superintendent, & Employees
7. Review of Contract Documents and Field Conditions by Contractor
8. Surveys by Contractor
9. Submittals
10. Documents and Samples at the Site
11. "As-built" Documents
12. Progress Schedule
13. Materials, Equipment & Substitutions
14. Safety & Protection of Persons & Property
15. Hazardous Materials
16. Inspection of the Work
17. Correction of Work
18. Deductions for Uncorrected Work
19. Changes in the Work
20. Claims for Extra Cost or Extra Work
21. Differing Site Conditions
22. Claims for Damages
23. Delays
24. Resolution of Claims and Disputes
25. Owner's Right to Correct Work
26. Owner's Right to Stop or Suspend the Work
27. Owner's Right to Terminate Contract
28. Contractor's Right to Suspend or Terminate
29. Progress Payments
30. Certification & Approvals for Payments
31. Payments Withheld
32. Substantial Completion
33. Occupancy or Use Prior to Completion
34. Final Payment
35. Contractor's Warranty
36. Indemnification Agreement
37. Insurance
38. Performance and Payment Bonds
39. Assignment
40. Construction by Owner or Separate Contracts
41. Subcontracts
42. Architect's Status
43. Cash Allowances
44. Permits, Laws and Regulations
45. Royalties, Patents and Copyrights
46. Use of the Site
47. Cutting and Patching
48. In-progress and Final Cleanup
49. Liquidated Damages
50. Use of Foreign Material
51. Sign

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 **ACCS FACILITIES DIVISION:** The ACCS Facilities Division, which is responsible for oversight and management of all ACCS construction projects, pursuant to the policies and procedures adopted by the ACCS Board of Trustees.

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 **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)

D **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.

E **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. 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.

F **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.

G **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)** substitutions 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.

H **CHIEF FACILITIES OFFICER:** The Director of the ACCS Facilities Division.

I **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.

J **NOTICE TO PROCEED:** A proceed order issued by the Owner, 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.

K **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" as defined and used in Title 39 - Public Works, Code of Alabama, 1975, as amended.

L **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.

M **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.

N **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.

O **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.

P **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 REPRESENTATION

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, one readable standard PDF set 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 &
(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* CONTRACTORS

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. Within twenty-four (24) hours of the Bid Opening, the Contractor's Schedule of Values must be submitted to the Architect from the apparent low bidder

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 through the use of an Architect's Supplemental Instruction (ASI). These "minor" deviations, or ASIs, 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 **"CONFORMANCE DOCUMENTS" SET**

The Contractor will be provided a Conformance Documents issue set of Drawings and Project Manual that incorporates all addenda items and all accepted alternates. The Contractor shall maintain at the Project site, in good order, at least one set of the Conformance Documents Drawings and Project Manual.

The Contractor shall assure that all sets of the Drawings and Project Manuals being used by the Contractor, Subcontractors, and suppliers are "Conformance Documents" with the current information to insure that updated Contract Documents are used for performance of the Work.

B **RECORD SET**

One set of the Drawings and Project Manual described in Paragraph A 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.

C The documents and samples required by this Article to be maintained at the Project site shall be readily available to the Architect, Owner, AHJ or other reviewing entity, and their representatives.

Article 11
"AS-BUILT" DOCUMENTS

A Unless otherwise provided in the Contract Documents, the Contractor shall deliver two (2) sets or one reapable standard PDF set 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 In conjunction with the construction schedule a progress schedule shall be prepared using ACCS Form 6-H "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. ACCS Form 6-H shall not be used as the construction schedule. 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 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, it is expected that the Architect formally notify the Contractor to produce a recovery schedule to meet the construction deadlines. If 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.

B 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.

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, AHJ, 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, AHJ, 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 an AHJ or other reviewing entity.

(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.

(5) It is the Contractor's responsibility to communicate to the Design Team the date and time of requested inspection(s). It is the Design Team's responsibility to coordinate the date and time of the requested inspection with the Contractor, AHJ or ICC, Owner (ACCS) and College (college designated representative).

(6) The following are the minimum participation requirements for inspections:

(a) Required inspection without an AHJ or ICC - both the Contractor and Design Professional of record.
(b) Required inspection with an AHJ or ICC - both the Contractor and Design Professional of record.

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 AHJ where applicable, and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers. 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) Pre-Asphalt Paving Installation and Expectations Conference
(d) Pre-Landscape Sod Installation and Expectations Conference
(e) Pre-Flooring Installation and Expectations Conference
(f) Below Slab/Underground Utility Inspection
(g) Footings and Foundation Inspection
(h) Concrete Slab Inspection
(i) Waterproofing and Building Envelope Inspection
(j) In-Wall Inspection
(k) Gypsum Board Inspection
(l) Roofing Inspection
(m) Storm Shelter Inspection (if applicable)

(n) 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.

(o) Elevator Inspection

(p) Fire Suppression Systems Inspection

(q) Fire Alarm System Inspection

(r) Emergency Lights and Exit Signs Inspection

(s) ADA Inspection

(t) Substantial Completion

(u) 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 AHJ or other reviewing entity 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. Punch list items shall contain only items that can be reasonably completed and inspected within 30 days so that the Owner can occupy without disruption or interference by the Contractor and to establish Final Acceptance of the Work. If punch list items and closeout documents are not completed within 45 days of issuance of Certificate of Substantial Completion, a Notice to Cure may be issued. 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.

(v) 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, or other reviewing entity at the direction of the Owner, 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 ACCS Facilities Division, 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 LOCAL AHJ OR INDEPENDENT CODE CONSULTANTS

(1) The Local AHJ or Independent Code Consultant 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 Local AHJ or Independent Code Consultant shall have the authority to:

(a) reject Work that is not in compliance with the State Building Code, unless the Work is in accordance with the Contract Documents in which case the Architect shall initiate appropriate corrective action, and

(b) notify the Architect, Owner, and Contractor of Defective Work recognized by the Local AHJ or Independent Code Consultant.

(3) The Local AHJ or Independent Code Consultant'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 Local AHJ or Independent Code Consultants can be requested to schedule special inspections or meetings to address specific matters. The written findings of the Local AHJ or Independent Code Consultants will be transmitted to the Owner, Contractor, and Architect.

(4) The Local AHJ or Independent Code Consultant 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 Local AHJ or Independent Code Consultant 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.

D All Defective Work, or Deficiencies, shall be tracked on a Project Deficiency Log that is reviewed and updated at least monthly at OAC meetings.

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* 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 through the use of an

Architect's Supplemental Instruction (ASI). These "minor" changes, or ASIs, 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) Liquidated damages are routed as Change Orders for work that the Contractor has failed to substantially complete within the Contract Time. Before the process of applying liquidated damages begins, communication and approval is required from the ACCS Chief Facilities Officer.

(8) All change orders require completion of ACCS Form 2-F Contract Change Order and ACCS Form 2-G Contract Change Order Justification forms. Only Change Orders 10% or greater of the current contract amount require the Owner's legal advisor's signature on the Change Order Justification form.

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. This amount shall be all-inclusive, covering direct costs, as well as any fees. Contractor shall furnish to the Owner an itemized breakdown of the quantities and prices to be used in estimating the value of any changes that might be ordered. For the purposes of this method, Contractor and Subcontractors, shall furnish, at a minimum, the following on their own letterhead; all material or vendor quotes (with quantities and unit cost), labor hours, labor rates, labor burdens, equipment, and any other relevant information necessary to analyze the quote. 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, joboffice, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

(a) For the Party performing the work, the cost of the work, less any credits, shall have a maximum markup for Overhead and Profit of 10%.

(b) The prime contractor or upper-tier subcontractor's markup on work performed by lower-tier subcontractors shall not exceed 10%. No more than 10% shall be added by each successive lower-tier subcontractor, if applicable, for a maximum of 20%.

(c) Article 19.B.1.a and 19.B.1.b shall also apply to Force Account changes.

(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. Each unit price is to include overhead, profit, and all other related costs.

(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

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. All Contract Time extension requests will be considered in relation to the Critical Path of the Construction Schedule. For purposes of this section, the Critical Path of the Construction Schedule determines the sequence of dependent tasks for project completion and identifies the shortest possible duration for completing the project.

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 14 days after receiving such a request, or such other time as may be stated in the request, the Contractor shall prepare and submit a written proposal along with the Change Proposal Recap Sheet to the Architect, 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 utilizing the Change Order Justification (ACCS Form 2-G). 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, or public authority having jurisdiction or Independent Code Consultant, 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 Chancellor, 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 Chancellor that the Claim be resolved by decision of a Professional, with Alabama licensing if the profession requires it, appointed by the Chancellor to review and determine the Claim. 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 Chief Facilities Officer. Upon receipt of a request to resolve a Claim, the Chief Facilities Officer 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.

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 *and* 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 over $100,,000):

(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 twenty-four (24) hours after the Bid Opening, the Contractor shall submit to the Architect ACCS Form 6-E, 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 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 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 Application and Certificate for Payment shall match to the penny and be accompanied by an attached 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) Application and Certificate for Payment shall be electronically submitted to ACCS Facilities Division for review following the Contractor's, Notary's, Architect's and Owner's signatures.

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 for ACCS Projects shall be governed by Title 39 of the Alabama Code.

(2) "Retainage" is defined as that money belonging to the contractor which has been retained by ACCS conditioned on final completion and acceptance of all work in connection with a project or projects by the contractor. Retainage will not be reduced. Full retainage will only be released with the final payment after completion of all punch list items, receipt of Certificate of Occupancy from AHJ, submittal of all warranties, releases of claims are received, surety consent to final payment received, submittal of record documents and all other closeout documents required by contract. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected Work.

(3) In making progress payments the Owner shall retain five percent of the estimated amount of work done and the value of materials stored on the site or suitably stored and insured off-site, and after 50 percent completion has been accomplished, no further retainage shall be withheld. The retainage as set out above shall be held until final completion and acceptance of all work covered by the contract.

F CONTRACTOR'S CERTIFICATION

(1) Each Application for Payment shall bear the Contractor's notarized 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.

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.

B 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.

C 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 AHJ, where applicable.

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, as specified in Article 16, 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. For the Certificate of Substantial Completion to be issued, the punch list of incomplete items must contain only items that the contractor can complete and reinspect within 30 days and will allow the Owner to occupy or utilize the Work for its intended use without disruption or interference by the Contractor completing or correcting the work. The contractor must submit a schedule that shows all punch list items completed in 30 days as an attachment to the Certificate of Substantial Completion. If punch list items are not completed within 45 days of issuance of Certificate of Substantial Completion, a Notice to Cure may be issued. 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 and sign a Certificate of Substantial Completion to be signed in order by the Contractor and Owner.

(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 and Owner,

(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 ACCS Form 6-K, Certificate of Substantial Completion, includes roofing work, the General Contractor's (5-year) Roofing Guarantee form 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. Failure to do so voids any Certificate of Substantial Completion. This requirement cannot be waived.

(5) Other attachments to the Certificate of Substantial Completion shall include the Punch List, the schedule of when Punch List items will be complete, an executed Pre Close Out Meeting Checklist, and a Change Order log showing that there are no outstanding change orders.

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.

F The Contractor shall complete or correct all items of any remaining Work ("punch list" items) , ready for re-inspection for Final Acceptance, within 30 days after the Date of Substantial Completion unless another date is specified in the Certificate of Substantial Completion. 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. Failure to complete or correct any items of remaining Work ("punch list" items) within 45 days will result in all warranties commencing on the Date of Final Acceptance.

G Nothing herein, including paragraph E above, shall limit or waive the Owner's rights under Article 27, including but not limited to issuance of Notices to Cure or Notice of Termination issued to Contractors and Sureties, to obtain completion, correction, or repair of any remaining unfinished Work ("punch list" items).

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 *and* PROJECT CLOSEOUT

A PREREQUISITES *to* FINAL PAYMENT

The following requirements must be accomplished before Owner issues Final Payment:

(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) Final building cleaning completed and accepted by Architect and Owner.

(4) Final punch list completed, reinspected and accepted by Architect and Owner.

(5) 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, owner training videos, warranties (Contractor's One-Year, General Contractor's Five-Year Roofing, etc.), schedule of attic stock including quantity, label, and storage location, etc.

(6) Delivery to the Owner of a final Application for Payment, prepared by the Contractor and approved and certified by the Architect. The Architect will prepare the Final Payment Checklist and forward it to the Owner along with the final Application for Payment.

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

(8) Delivery by the Contractor to the Owner through the Architect of a Release of Claims and such other documents as may be required by Owner, satisfactory in form to the Owner pursuant to Paragraph D below

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

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

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 AHJ if applicable, or (2) their resolution under Article 18, Deductions for Uncorrected Work.

C ADVERTISEMENT *for* COMPLETION

(1) If the Contract Sum is $100,000 or less, there is no requirement for Advertisement for Completion.

(2) If the Contract Sum is more than $100,000: 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 successive weeks in some newspaper of general circulation published within the city or county where the Work was performed. Proof of publication of the Advertisement for Completion shall be made by the Contractor to the Architect by affidavit of the publisher, in duplicate, and a printed copy of the Advertisement for Completion published, in duplicate. If no newspaper is published in the county where the work was done, the notice may be given by posting at the Court House for thirty days and proof of same made by Probate Judge or Sheriff and the Contractor. Final payment shall not be due until thirty days after this public notice is completed.

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 AHJ or an Independent Code Consultant, where applicable. 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", ACCS Form 6-L 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.

(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 and Owner.

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, ACCS Facilities Division, 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.

(1) 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.

(2) 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.

(3) 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) PROOF OF INSURANCE. The Contractor shall be responsible for providing proof of the insurance coverage required in this Article. Failure to provide proof of the insurance required in this Article will prevent a construction contract from being executed and may result in the Contractor's bid being deemed non-responsive. After execution of a Construction Contract, failure to provide proof of insurance required in this Article will prevent payment of all pending pay applications, will immediately result in a Project wide stop work order, and will result in termination of the Construction Contract if proof is not timely provided. If ACCS cannot determine whether insurance requirements have been met through the Contractor's Certificate of Insurance submission, it shall be the Contractor's responsibility to provide additional documentation that shows these insurance requirements are satisfied.

(3) 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.

(4) 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.

(a.) If the Contractor's insurance carrier will not provide a 30 day cancellation notice for non-payment of premium, Contractor agrees that the following must be added to the Construction Contract:

.1 Contractor or its insurance broker or other insurance representative will provide ACCS 30 day written notice by certified mail as evidenced by return receipt of any reasonably expected or known failure to make any premium payment(s) that could result in cancellation of any policy for non-payment of premium.

.2 Contractor will provide proof of premium payment(s) with each Pay app submitted.

.3 Contractor will provide proof of premium payment(s) if ever requested by ACCS. Contractor also understands that failure to provide proof of premium payment will prevent payment of all pending pay apps, will immediately result in a Project wide stop work order, and will result in termination of the Construction contract if proof is not timely provided.

(5) 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.

A replacement certificate must be provided to ACCS Facilities Division and the College accounting office at least 10 calendar days prior to the expiration of any policy. All renewed or replaced policies must meet the insurance requirements of ACCS.

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

(6) 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, ACCS, 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, ACCS, and their agents, consultants, and employees as additional insureds.

(4) COMMERCIAL UMBRELLA LIABILITY INSURANCE

(a) Commercial Umbrella 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 Commercial/Excess Umbrella Limits of:

.1 $5,000,000 per Occurrence

.2 $5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella Liability Insurance:

.1 The policy shall name the Owner, Architect, ACCS, 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 general contractor is required to purchase builder's risk coverage. Coverage should be "all-risk" including, but not limited to, the following perils: fire, windstorm, hail, water damage, flood, mold, earth movement (also known as "earthquake"), vehicle or equipment collision, paint overspray, collapse, vandalism and lightning. Coverage must be on a replacement cost basis. The carrier must be A- rated or better by AM Best and admitted in the State of Alabama. The coverage period must start on the first day of construction and must extend a minimum of 30 days after receipt of the Certificate of Substantial Completion. Property must be insured while in transit, while stored at an off-site location, while on the construction site but not yet attached to the building and after being attached to the building. The general contractor is responsible for absorbing the deductible in the event of a loss, and the deductible cannot exceed $10,000. ACCS must be included on the policy as both an additional named insured and a loss payee. An Evidence of Property Insurance certificate must be provided showing both additional named insured and loss payee status, coverages and limits prior to the start of construction. Coverage limits must be as follows:

.1 Hard Costs: insured to full value

.2 Soft Costs: insured to full value

.3 Furniture and Fixtures: insured to the full value of items being purchased and/or installed by the contractor under the construction contract.

.4 Business Interruption: $100,000

(b) On information technology projects or any other project approved in writing by the ACCS Chief of Facilities, an Installation Floater policy may be approved in place of a Builder's Risk policy described above. Coverage should be "all-risk." The Installation Floater policy must have a minimum policy limit to cover all material, equipment, or other property for which the Contractor is legally liable. The presumed minimum policy limit shall be $2 Million unless a higher or lower limit is approved in writing prior to the opening of bids by the ACCS Facilities Division. With its COI, Contractor shall submit documentation from its insurance broker or agent confirming that ACCS's Installation Floater insurance requirements are met by Contractor's policy.

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 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.

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), ACCS Form 2-C and 2-D, 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. There shall be six original P&P Bonds submitted with original signatures for each of the six contracts required. 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 an original 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 ACCS, 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
CONTRACTION *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.

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.

B **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 through the use of Architect's Supplemental Instruction (ASI), as defined in Article 9, Submittals,

(b) make "minor" changes, through the use of Architect's Supplemental Instruction (ASI), 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.

C 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.

D 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 Supplementary Conditions of 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 (including all AHJ fees) 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 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.

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, 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.

E Liquidated Damages use ACCS Form 2-F and are routed as Change Orders for work that the contractor has failed to substantially complete within the Contract Time. Before the process of applying liquidated damages begins, communication and approval is required from the ACCS Chief Facilities Officer. The Contractor's signature is not required for Liquidated Damages using ACCS Form 2-F.

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 steel produced in the United States if the Contract Documents require the use of 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 project sign is not required for ACCS projects unless specifically indicated in the drawings or project manual.

END OF GENERAL CONDITIONS OF THE CONTRACT

FACILITIES DIVISION

ACCS FORM 2-C

PERFORMANCE BOND

7 **SURETY'S BOND NUMBER:**	

1 The **PRINCIPAL** (Company name and address of Contractor as appears in the Construction Contract)

NAME:	
Address:	

2 The **SURETY** (Company name and primary place of business)

NAME:	
Address:	

3 The **OWNER:** THE ALABAMA COMMUNITY COLLEGE SYSTEM ON BEHALF OF:

Address:	

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

5 **DATE** of the Construction Contract:

6 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.

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.

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 -Month- -Year-

9 **SURETY:**

_____
SURETY COMPANY NAME

BY: _____
SIGNEE'S PRINTED NAME

TITLE: _____
SIGNEE'S TITLE

10 **CONTRACTOR** as **PRINCIPAL:**

_____
CONTRACTOR COMPANY NAME

BY: _____
SIGNEE'S PRINTED NAME

TITLE: _____
SIGNEE'S TITLE

11 **NOTE:** Original power of attorney for the Surety's signatory shall be furnished with the original bond form to be attached to each of the contract forms per project.

FACILITIES DIVISION

ACCS FORM 2-D

PAYMENT BOND

7 **SURETY'S BOND NUMBER:**	

1 The **PRINCIPAL** (Company name and address of Contractor as appears in the Construction Contract)

NAME:	
Address:	

2 The **SURETY** (Company name and primary place of business)

NAME:	
Address:	

3 The **OWNER:** THE ALABAMA COMMUNITY COLLEGE SYSTEM ON BEHALF OF:

Address:	

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

5 **DATE** of the Construction Contract:

6 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.

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 -Month- -Year-

9 **SURETY:**

_____
SURETY COMPANY NAME

BY: _____
SIGNEE'S PRINTED NAME

TITLE: _____
SIGNEE'S TITLE

10 **CONTRACTOR** as **PRINCIPAL:**

_____
CONTRACTOR COMPANY NAME

BY: _____
SIGNEE'S PRINTED NAME

TITLE: _____
SIGNEE'S TITLE

11 **NOTE:** Original power of attorney for the Surety's signatory shall be furnished with the original bond form to be attached to each of the contract forms per project.

FACILITIES DIVISION

ACCS FORM 2-F

***NOTE: Any Change Orders without documented ACCS Facilities Division approval will be at the expense of the Architect and/or the Contractor.**

CONTRACT CHANGE ORDER

ACCS PROJECT#:	
CHANGE ORDER#:	
DATE:	

PROJECT:

TO: <Contractor Company Name>

Address:	

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.)

Review/Initial of Regional Facilities Director _____

ACCS FORM 2-F

ORIGINAL CONTRACT SUM:		ORIGINAL SUBSTANTIAL COMPLETION DATE:	
NET TOTAL OF PREVIOUS CHANGE ORDERS:		ORIGINAL CONTRACT DURATION (DAYS):	
PREVIOUS REVISED CONTRACT SUM:	$ 0.00	NET TOTAL OF DAYS FROM PREVIOUS CHANGE ORDERS:	0
THIS CHANGE ORDER WILL: ◯ INCREASE ◯ DECREASE ◯ USE ALLOWANCES		THIS CHANGE ORDER WILL: ◯ INCREASE ◯ DECREASE	
THE CONTRACT SUM BY:		THE CONTRACT DURATION BY (DAYS)	0
REVISED CONTRACT SUM, INCLUDING THIS CHANGE ORDER:	$ 0.00	REVISED CONTRACT DURATION, INCLUDING THIS CHANGE ORDER:	
The amount of this Change Order will be the responsibility of: <Select Client>		REVISED SUBSTANTIAL COMPLETION DATE, INCLUDING THIS CHANGE ORDER:	

The **OWNER** does hereby certify that this **CHANGE ORDER** was executed per the provisions of Title 39, Code of Alabama, 1975, as amended.

RECOMMENDED BY

_____
ARCHITECTURAL/ENGINEERING FIRM

BY: _____

NAME: _____

TITLE: _____

APPROVALS

_____
COMMUNITY COLLEGE PRESIDENT

BY: _____
SIGNATURE OF OFFICER

NAME: _____

TITLE: _____

ALABAMA COMMUNITY COLLEGE SYSTEM (ACCS)

BY: _____ DATE: _____
CHIEF FACILITIES OFFICER

CONTRACTING PARTIES

_____
CONTRACTOR COMPANY

BY: _____

NAME: _____

TITLE: _____

ALABAMA COMMUNITY COLLEGE SYSTEM
(AS OWNER)

BY: _____
CHANCELLOR

CONSENT OF SURETY

_____
SURETY COMPANY

BY: _____
(ATTACH CURRENT POWER OF ATTORNEY)

Review/Initial of Regional Facilities Director _____

FACILITIES DIVISION

ACCS FORM 2-G

***NOTE: Any Change Order without documented ACCS Facilities Division approval is the expense of the Architect and/or the Contractor.**

CHANGE ORDER JUSTIFICATION

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

CHANGE ORDER JUSTIFICATION #		ACCS PROJECT #		DATE:	

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)*

C THIS CHANGE ORDER WILL: ◯ INCREASE ◯ DECREASE		THE CONTRACT SUM BY:	
THIS CHANGE ORDER WILL USE ALLOWANCES: ◯ YES ◯ NO		THE AMOUNT OF ALLOWANCES USED:	
THIS CHANGE ORDER WILL: ◯ INCREASE ◯ DECREASE		THE CONTRACT DURATION BY (DAYS):	

D **THE CHANGE ORDER IS:**

- ◯ **Owner (ACCS) directed changes in the Work**
- ◯ **College requested changes in Work**
- ◯ **Differing (hidden) site conditions**
- ◯ **Other (please explain in Section D)**

JUSTIFICATION FOR NEED OF CHANGE(S):

Attach documented written approval from ACCS to proceed with change order.

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

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

Review/Initial of Regional Facilities Director _____

G CHANGER ORDER RECOMMENDED	CHANGE ORDER JUSTIFIED AND APPROVED
_____ ARCHITECTURAL/ENGINEERING FIRM NAME BY: _____ ARCHITECT/ENGINEER'S SIGNATURE BY: _____ OWNER'S DESIGNATED REPRESENTATIVE SIGNATURE	BY: _____ ACCS CHIEF FACILITIES OFFICER BY: _____ OWNER'S LEGAL COUNSEL'S SIGNATURE (FOR CHANGE ORDERS 10% OR GREATER)

CHANGE ORDER JUSTIFICATION: PURPOSE and 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 **CHANGE ORDER JUSTIFICATION** must accompany the proposed Change Order. Instructions for completing the Change Order Justification form are:

1. Insert the proposed Change Order Number, date of the Justification, and ACCS 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(S), CONTRACTOR, AND ARCHITECT/ENGINEER.

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

4. Section (C): Insert the Contract Sum increase or decrease and the Contract Duration increase or decrease of Days of this Change Order request.

5. Section (D): Explain why it is necessary, or in the public's interest, to make the proposed change(s) to the Work. Select the type of Change Order. Attach documented written approval.

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 or her evaluation of the reasonableness and fairness of the proposed costs based upon his or her 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.

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

FACILITIES DIVISION ACCS FORM 6-D

APPLICATION AND CERTIFICATE FOR PAYMENT

ACCS PROJECT#:		APPLICATION#:		DATE:	
PROJECT:					

TO COLLEGE:			
Address:		Phone:	
		Email:	
FROM CONTRACTOR:			
Address:		Phone:	
		Email:	
ARCHITECT/ENGINEER:			
Address:		Phone:	
		Email:	

TOTAL ORIGINAL CONTRACT:	
FULLY EXECUTED CHANGE ORDER(S) NUMBERS THROUGH	
TOTAL CONTRACT TO DATE:	$ 0.00
Work Completed to Date per attached Schedule of Values:	
Stored Materials:	
Total Completed Work and Stored Materials: (% of Contract To Date)	$ 0.00
5% of Total Completed Work and Stored Materials (TCWSM) is retained when TCWSM is less than or equal to 50% of Total Contract to Date. 0% retained when TCWSM is more than 50% of Total Contract to Date. 0 is retained on final pay app.	☐ **Final Payment Application**
Less Retainage: $ 0.00 **Total Due:**	$ 0.00
Less Total Previous Payments:	$ 0.00
Balance Due This Estimate:	$ 0.00

1 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 <month>

(SEAL) _____
NOTARY PUBLIC'S SIGNATURE

2 ARCHITECT'S/ENGINEER'S CERTIFICATION

In accordance with the Contract Documents, the Architect or Engineer of Record certifies to the Owner and College that to the best of the Architect's/ Engineer's knowledge and belief:

1. the work has progressed to the point indicated herein **and according to the updated attached project master schedule,**
2. the quality of the Work is in accordance with the Contract documents, and
3. the Contractor is entitled to payment of the amount approved.

By: _____ **Date:** _____
ARCHITECT'S/ENGINEER'S SIGNATURE

Name: _____

Title: _____

INSTRUCTIONS

- Contractor's signature date cannot precede this Pay App date.
- One payment application per month may be submitted.
- Retainage is released as final payment when all close-out requirements per General Conditions Article 34 are completed with ACCS Form 7-F Project Close Out Checklist attached.

3 COLLEGE APPROVAL

By: _____ **Date:** _____
COLLEGE

Name: _____

Title: _____

REQUIRED ATTACHMENTS: 1 ACCS Form 6-E Schedule of Values; 2 practicable construction schedule approved when the Notice to Proceed was issued; 3 updated construction schedule using ACCS Form 6-H Progress Schedule & Report or approved "more comprehensive schedule format;" 4 copies of all approved ACCS Form 2-F Contract Change Orders requesting payment this Pay Application (see General Conditions of the Contract, Article 12 – Progress Schedule).

IF APPLICABLE: ANY PAY APPLICATION THAT REDUCES RETAINAGE REQUIRES ACCS APPROVAL PRIOR TO PROCESSING FOR PAYMENT

_____ **Name:** _____ **Date:** _____
ACCS FACILITIES REPRESENTATIVE

SCHEDULE OF VALUES

ACCS Form 6-E

Project:

ACCS Project No.:

Contractor Company:

Application No.:

Retainage: *5% of Completed Work and Stored Materials to Date (G) is retained when G Total is less than 50% of Scheduled Value (C) Total. 0 is retained on final payment application.*

Application Date:

Period From: Period To:

A	B	C	D	E	F	G		H	I
Item No.	Description of Work	Scheduled Value (including fully executed change orders)	Work Completed: From Previous Application (D+E)	Work Completed: This Period	Materials Presently Stored (Not in D or E)	Completed Work & Stored Materials to Date (D+E+F)	% of Contract to Date (G/C)	Balance to Finish (C-G)	Retainage (Variable Rate)
1.						$ -			$ -
2.						$ -			$ -
3.						$ -			$ -
4.						$ -			$ -
5.						$ -			$ -
6.						$ -			$ -
7.						$ -			$ -
8.						$ -			$ -
9.						$ -			$ -
10.						$ -			$ -
11.						$ -			$ -
12.						$ -			$ -
13.						$ -			$ -
14.						$ -			$ -
15.						$ -			$ -
16.						$ -			$ -
17.						$ -			$ -
18.						$ -			$ -
19.						$ -			$ -
20.						$ -			$ -
21.						$ -			$ -
22.						$ -			$ -
23.						$ -			$ -
24.						$ -			$ -
25.						$ -			$ -
26.						$ -			$ -
27.						$ -			$ -
28.						$ -			$ -
29.						$ -			$ -
30.						$ -			$ -
	TOTALS:	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**		**$ -**	**$ -**

INVENTORY OF STORED MATERIALS

Project:	ACCS Project No.:
Contractor:	For Estimate No.:
	For Period Ending:

A	B	C	D	E	F
DESCRIPTION	MATERIALS STORED LAST PERIOD	PURCHASED THIS PERIOD	TOTAL COLUMNS B + C	MATERIALS USED THIS PERIOD	MATERIALS PRESENTLY STORED

To be used as documentation to support value of Stored Materials reported on APPLICATION AND CERTIFICATE FOR PAYMENT.

ACCS FORM 6-H

SAMPLE PROGRESS SCHEDULE & REPORT

ACCS Project No.:

PROJECT:

CONTRACTOR (Contractor may use own form):

ARCHITECT/ENGINEER:

DATE OF REPORT:

PROCEED DATE:

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.

FACILITIES DIVISION

ACCS FORM 6-K

CERTIFICATE OF SUBSTANTIAL COMPLETION

TO:
ACCS FACILITIES DIVISION
135 S. Union Street
Montgomery, AL 36130
(334) 293-4500

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

	ACCS PROJECT#:
OWNER ENTITY NAME AND ADDRESS: Email to receive executed copy:	**ARCHITECTURAL/ENGINEERING FIRM NAME & ADDRESS:** Email to receive executed copy:
CONTRACTOR COMPANY NAME AND ADDRESS: Email to receive executed copy:	**BONDING COMPANY NAME AND ADDRESS:** 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. Failure to complete or correct any items of remaining Work ("punch list" items) within 60 days will result in all warranties commencing on the Date of Final Acceptance.

The **Year End Inspection Date** to help identify and address any construction defects or warranty issues shall be established as _____ , which is 11 months after the **Date of Substantial Completion**.

Nothing herein shall limit or waive the Owner's rights under Article 27 of the General Conditions (ACCS Form 2-B), including but not limited to issuance of Notices to Cure or Notice of Termination issued to Contractors and Sureties, to obtain completion, correction, or repair of any remaining unfinished Work ("punch list" items).

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

RECOMMENDED BY:		CONTRACTING PARTIES:	
ARCHITECT/ENGINEER	DATE	CONTRACTOR	DATE
APPROVALS:			
AHJ INSPECTOR (IF APPLICABLE)	DATE	ACCS CHIEF FACILITIES OFFICER	DATE
***A/E PEER REVIEWER**(IF APPLICABLE)	DATE		
OWNER'S DESIGNATED REPRESENTATIVE	DATE		
ACCS REGIONAL FACILITIES DIRECTOR	DATE		

*ACCS Colleges are required to provide an A/E Peer Reviewer to review the A/E of Record's project design and to perform construction inspections when AHJ is not present in city/town where project's work is taking place.

Required Certification: The Certification of Structural Observations (ACCS Form 6-J) shall be prepared by the Structural Engineer of Record for all projects containing classrooms or dorm rooms on the grounds of public institutions of higher education as required by ACT#2012-554. Where applicable to the project, the certification must be attached to the Certificate of Substantial Completion.

FACILITIES DIVISION

ACCS FORM 6-L

GENERAL CONTRACTOR'S ROOFING GUARANTEE

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

ACCS PROJECT#:			
PROJECT NAME:			
Address:			
PROJECT OWNER:			
Address:			
CONTRACTOR COMPANY:			
Address:		Phone:	
		Email:	

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

BY: _____

SIGNEE'S PRINTED NAME

TITLE: _____

SIGNEE'S TITLE

FACILITIES DIVISION

ACCS FORM 6-M

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:

at:

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)

BUSINESS ADDRESS:

_____

(Contractor)

NOTE: This notice must be run once a week for three successive weeks for projects exceeding $100,000. For projects of $100,000 or less, there is no requirement for Advertisement for Completion. A copy of the publisher's affidavit of publication (including a copy of the advertisement) shall be submitted by the Contractor to the Design Professional.

FACILITIES DIVISION

ACCS FORM 6-N

CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

ACCS PROJECT#:			
DATE OF THE CONSTRUCTION CONTRACT:			
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, a Consent of Surety form is required.

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

_____

CONTRACTOR

NAME :

ADDRESS :

_____

SIGNATURE OF AUTHORIZED REPRESENTATIVE

BY: _____

SIGNEE'S PRINTED NAME

TITLE: _____

SIGNEE'S TITLE

Sworn to and subscribed before me this

_____ day of _____ ,

_____ .

_____

NOTARY PUBLIC'S SIGNATURE

My commission expires: _____

SEAL

FACILITIES DIVISION

ACCS FORM 6-P

CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

ACCS PROJECT#:	
DATE OF THE CONSTRUCTION CONTRACT:	
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. 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

NAME :

ADDRESS :

SIGNATURE OF AUTHORIZED REPRESENTATIVE

BY: _____

SIGNEE'S PRINTED NAME

TITLE: _____

SIGNEE'S TITLE

Sworn to and subscribed before me this

_____ day of _____ ,

_____ .

NOTARY PUBLIC'S SIGNATURE

My commission expires: _____

SEAL

VER: 03282024

FACILITIES MANAGEMENT

ACCS FORM 6-Q

CONSENT OF SURETY TO FINAL PAYMENT

ACCS PROJECT#:	
DATE OF THE CONSTRUCTION CONTRACT:	
SURETY'S BOND NUMBER:	

TO: OWNER (THE ALABAMA COMMUNITY COLLEGE SYSTEM)

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:

on bond 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 the Owner.

as set forth in said Surety's bond.

SIGNED AND SEALED this _____ day of _____.

SURETY: _____ **SEAL:**

COMPANY NAME

BY: _____

SIGNATURE OF AUTRHORIZED REPRESENTATIVE

_____

PRINTED NAME AND TITLE

Note: Original Power of Attorney for the Surety's signatory shall be furnished with each original form.

SECTION 01 0150
SPECIAL CONDITIONS

1.01 TIME FOR COMPLETION OF WORK

A. The Contractor's official time for construction to start work shall be the date of the Owner's written "Notice to Proceed" with the Work; and Substantial Completion of the Work shall be achieved within **THREE-HUNDRED THIRTY** (330) CONSECUTIVE CALENDAR DAYS.

B. The Contractor may proceed to award sub-contracts, assemble materials, etc., after written "Notice To Proceed" with the Work is given by the Owner.

C. Properly supervised work, per requirements, will be permitted after normal operating hours and Saturdays and Sundays.

D. Acceptance of the completed Work of this Contract will be at a single date, and not in phases, unless otherwise indicated.

E. Nothing in the Contract Documents shall permit or be construed to permit payment to the Contractor for any extended overhead or profit due to completion of the project extending beyond the Contractual completion date. In no event shall the Owner or Architect be liable to the Contractor for damage due to any delay to any portion of the Work of this Contract.

F. See Article 23 of the General Conditions of the Construction Contract (ACCS Form 2-B) for conditions and procedures related to delays for inclement weather and other schedule impacts beyond the Contractor's control.

1.02 LIQUIDATED DAMAGES

A. Actual damages for delay in completion may be impossible to determine, and the Contractor shall be liable for and the Owner shall deduct as liquidated damages from the final payment due the Contractor, the following, as mutually agreed to and fixed amounts, in addition to the amount indicated in Article 49 of "General Conditions of the Contract for Construction":

1. For each calendar day of delay in completion of any part of the work beyond the number of days specified, the sum of $1,500.00.
2. In the event that work on this project is incomplete and ongoing after the contractual completion date, beginning at ten (10) additional days thereafter, the Owner will also charge the Contractor, an additional $500.00 per day, for the Owner's nominal reimbursement to the Architect for continued work on the project, which charges will continue until "Substantial Completion" is accomplished.

B. By submitting a Bid Proposal, the General Contractor and their Subcontractors acknowledge and acceptance these Liquidated Damages provisions.

1.03 PRE-BID CONFERENCE

A. Refer to Advertisement for Bids and Instructions to Bidders, for additional information and requirements of the Pre-Bid Conference, including whether attendance is recommended or mandatory.

1.04 PRE-CONSTRUCTION CONFERENCES

A. Refer to Section 01 3000 - Administrative Requirements.

1.05 CONTRACTOR ACCESS TO SITE

A. The Contractor will have access to the site immediately upon receipt of the Owner's written Notice to Proceed with work. All routes of access to the site and gate locations by the Contractor or their subcontractors, are subject to approval by Owner, Architect, and other authorities having jurisdiction. Refer to Section 01 1000 - Summary of The Work and Section 01 5000 - Temporary Facilities and Controls, for additional information and requirements.

B. The Contractor shall be required to coordinate the Work of the project with the Owner's activities, to the extent that the Work of this Contract has little or no effect on normal operations.

1.06 CONTRACTOR'S PLAN FOR CONSTRUCTION OF PROJECT

A. Contractor shall prepare and submit within 7 days from award of contract to the Architect for review and approval a Bar Graph, indicating his proposed plan and sequence of operations to complete each phase of this project, on schedule as required by contract. This Bar Graph is expected to be a Critical Path graph.
   1. Schedule should identify project milestones and expected durations.

1.07 CONTRACTOR JOB MEETINGS

A. On-Site Meetings with Architect, designated Owner's Representative, and various trades and subcontractors, shall be conducted by the Contractor as directed by the Architect for purpose of furthering the progress of the work, solving construction problems, and issuing instructions.

B. Refer to "Pre-construction Conferences" paragraph above, "General Conditions of the Contract", and Section 01 3000 - Administrative Requirements for additional information and requirements.

1.08 STORED MATERIALS

A. It is recognized that the size of the site is restrictive and that it may be necessary for the Contractor to store some materials on site prior to removal or disposal. When such on site storage is necessary, comply with requirements of authorities having jurisdiction, including in part, on site retention of earth, storm water run-off, slopes of debris, earth, etc.

B. Store items to be incorporated in the Work in stable and secure manner, off of ground, separated by hardwood or treated wood blocking, and under cover or in storage building.
   1. Any materials found stored directly on ground or paving, in standing water, etc., will be rejected. Rejected materials shall immediately be removed from the site, and replaced with new materials at the Contractor's expense.
   2. Distribute materials around concrete slabs, framed floors and roofs in such manner as to prevent any damage to structure, construction, improvements, etc.

C. Refer to Section 01 6000 - Product Requirements, for additional information and requirements for any off-site stored materials.

1.09 PROTECTION

A. The Contractor shall provide and maintain adequate fencing and barricades, where indicated, and wherever required. Building entrances and exits shall remain unobstructed at all times when buildings are occupied.

B. The Contractor shall provide suitable protection for all employees, the public, users of other adjacent facilities, and building occupants at all times during the execution of the Work until the completion of the Work.
   1. Construction equipment shall not come in contact with or swing over existing facilities to remain, public areas, occupied buildings, right-of-ways, etc.

C. The Contractor shall avoid damage as a result of their operations, to the existing buildings, walks, pavement, curbs, grass, shrubbery, trees, utilities, adjoining property, etc., and shall at its own expense, completely repair any damage thereto caused by Contractor operations. All repair work is subject to Architect's approval and that of its Owner.

D. Refer to Section 01 5000 - Temporary Facilities and Controls for additional information and requirements.

1.10 WORK LIMITS PROTECTION

A. The Contractor shall locate all temporary buildings, equipment storage, material storage, and related staging areas within a secure area to protect the public, students, children, and others

from construction activities. The type and location of such protection shall be determined by the Contractor based on an assessment of the site conditions and restraints, but shall be subject to acceptance of the Architect, Owner, and authorities having jurisdiction.

B. Refer to Section 01 5000 - Temporary Facilities and Controls for additional information and requirements.

1.11 EMPLOYMENT OF AND PAYMENT FOR TESTING SERVICES

A. The following information regarding Employment of and Payment for Testing Services under the work of Specifications shall take precedence over any conflicting statements otherwise, which may have remained in the Project Manual after editing:
   1. Initial testing required by the Contract Documents for Divisions 2 through 5, and Divisions 31-33 (except not utility systems testing) shall be provided by an independent testing agency selected, employed and paid by the Owner.
   2. Initial testing required by the Contract Documents for all other testing and Divisions 6 through 26 shall be provided by a testing agency acceptable to the Owner, and selected, employed, and paid by the Contractor from his/her Contract amount.
   3. Any retesting required (due to failure of initial testing to meet the requirements of the Contract Documents) shall be at the Contractor's expense.
   4. Any retesting required (due to questionable materials or construction methods, for verification purposes, and etc.) shall be at the Contractor's expense when the results of such retesting indicate any work or materials do not comply with requirements of the Contract Documents. Otherwise, such retesting will be at Owner's expense.
   5. Any retesting under the above provisions shall be performed by the same Owner accepted testing agency.
   6. Nothing in the Contract Documents shall prevent the Contractor from performing any other or additional Quality Control testing at his/her own expense, to verify compliance with the Bid and Contract Documents.

B. The Contractor shall be responsible for contacting and directions to the accepted testing agency and for any follow-up communications required, for all testing required by the Contract Documents.

C. Refer to Section 01 4000 - Quality Requirements for additional information and requirements.

1.12 PROHIBITED MATERIALS

A. ASBESTOS: All materials, equipment, components, accessories, and etc., installed in the work of this contract, both field installed and bought-out manufactured items from any source shall be 100-percent free of asbestos.

B. LEAD CONTENT: All water-bearing lines, water dispensing equipment, finish materials, and paint other than exposed exterior roof flashings, shall be 100-percent free of lead.

C. CALCIUM CHLORIDE: Calcium chloride and/or derivatives or additives thereof shall not be permitted in any concrete, concrete product, grout, masonry and/or mortar.

D. ENVIRONMENTAL REGULATIONS: All materials, their application, installation, and completion, shall comply with applicable environmental regulations, including in part, erosion, air-borne contaminants, and volatile organic compounds (VOC's).

E. FORMALDEHYDE: All insulation and other products shall be 100-percent free of formaldehyde.

1.13 PROJECT SIGNS

A. This project DOES NOT require an Owner defined project sign or project plaque. The General Contractor shall furnish and install safety and directional signage as indicated herein.

B. Provide, securely install and maintain prefinished metal signs on each side of each gate leaf and at 50'-0" o.c. maximum on street/public side of all construction fencing provided (if any).
   1. Copy: "NO TRESPASSING
   2. DANGER
   3. CONSTRUCTION AREA"
   4. Size:Approximately 1'-6" wide x 1'-0" high.

C. Provide other pedestrian and vehicular signs as necessary and required, in compliance with requirements of authorities having jurisdiction. Signs shall remain on site for duration of this Contract.

D. General Contractor may have a sign on his/her Construction Office and as needed for delivery directions only.

E. Subcontractors will not be allowed to post signs.

1.14 PERSONNEL EXPERIENCE AND SUPERINTENDENTS

A. As outlined under Section 6 in the ACCS Contractor Pre-Qualification Application, the Bidder shall present to the Owner satisfactory evidence with its bid response that the Bidder's construction management and supervisory personnel are skilled and experienced in the work to be undertaken on the project. Failure to provide materials suggested below could result in a determination that a bid or bidder is not responsive and/or responsible for this Project's purposes.

B. The following minimum skills and experience shall be used to evaluate bid responses in light of the requirements set out in Section 6 of the ACCS Contractor Pre-Qualification Application:
   1. Construction scheduling, sequencing, and supervision is the sole responsibility of the Contractor. The Contractor shall provide on-site, and off-site, staff as required to successfully complete all work required by the contract documents within the specified contract time. The following are minimum requirements/expectations of the owner for job supervision.
      a. Project Manager
         1) The Contractor shall employ at least one full-time, off-site project manager assigned to the project.
         2) The Contractor's project manager must be an employee of the General Contractor. Third-party project management will not be acceptable for the project.
         3) The Contractor shall provide a project manager with minimum of five years' experience serving as a project manager on projects of similar size, scope and complexity, and cost. Submission of a resume of the project manager with bid responses for evaluation purposes as set forth in Section 6 is strongly encouraged.
      b. Construction Superintendent
         1) In addition to the project manager, the Contractor shall assign an on-site project superintendent who is dedicated fulltime to the project.
         2) The construction superintendent must be an employee of the General Contractor. Third-party construction superintendents will not be acceptable for the project.
         3) The construction superintendent must be on site at all times that any work is being performed by the General Contractor's personnel or any personnel from a subcontractor.
         4) The Contractor may assign additional on-site superintendents as deemed necessary for successful completion of the work.
         5) The construction superintendent shall have a minimum of five years' experience serving as a construction superintendent on projects of similar size, scope,

complexity and cost. Submission of a resume of the complexity and cost. Submission of a resume of the construction superintendent with bid responses for evaluation purposes as set forth in Section 6 is strongly encouraged.

c. Quality Control (QC) Manager
   1) The Contractor shall employ a full-time, on-site, staff member to serve as the overall quality control manager for the project.
   2) The QC Manager must meet the following requirements:
      (a) The QC Manager must have documented experience serving in a quality control role for a minimum of 10 years. Alternatively, the QC Manager may have 5 years of experience serving in a quality control role if the QC Manager has a 4-year degree in Building Science or 4-year degree in Civil Engineering from an accredited university.
      (b) The QC Manager must have served as the QC Manager on projects of similar size and complexity. An individual with experience on projects of similar size and complexity is defined as an individual meeting the following criteria: Served as construction superintendent or quality control manager for at least three projects exceeding $105,000,000 in construction cost.
      (c) The QC Manger must have experience in implementing and managing quality assurance (QA) and a quality control (QC) on projects of similar size and complexity.
   3) The QC Manager may serve as an alternate superintendent for up to 5 consecutive calendar days upon either a planned or unexpected absence of one of the primary construction superintendents. If the primary superintendent absence overlaps or exceeds 5 consecutive calendar days, the Contractor shall assign a qualified individual to assume the role of the absent primary superintendent.
   4) Submission of a resume of the QC manager with bid responses for evaluation purposes as set forth in Section 6 is strongly encouraged.

d. Site Safety Manager
   1) In addition to the required construction superintendent and Site QC Manger, the General Contractor shall provide one or more Site Safety Mangers(s).
   2) The role of site safety manager can be filled by the QC Manger or the Construction Superintendent.
      (a) If the construction superintendent is intended to fill the role of Site Safety Manager, the required construction superintendent must meet the required OSHA credential below and shall serve as Site Safety Manger for the respective project scope.
      (b) Alternatively. the QC Manager may serve as an overall Site Safety Manager.
   3) The individual fulfilling the Site Safety Manager responsibility must have completed required OSHA training and be a holder, in good standing, of a current OSHA 30-Hour Card.
   4) Submission of a copy of the Site Safety Manger's current OSHA 30-Hour Card with bid responses for evaluation purposes as set forth in Section 6 is strongly encouraged.

1.15 CONTRACTOR'S QUALITY CONTROL (CQC) PLAN:

A. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
   1. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.

a. Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.

B. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
1. Management and control of documents and records relating to quality.
2. Communications.
3. Coordination procedures.
4. Resource management.
5. Process control.
6. Inspection and testing procedures and scheduling.
7. Control of noncomplying work.
8. Tracking deficiencies from identification, through acceptable corrective action, and verification.
9. Control of testing and measuring equipment.
10. Project materials certification.
11. Managerial continuity and flexibility.

C. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid.

D. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel. as necessary, to obtain specified quality of work results.

E. The required Quality Control Manager shall implement and manage the Contractor's Quality Control Plan for the entire duration of the pproject.

1.16 SUBMITTALS

A. Submittal requirements are indicated throughout the Contract Documents, and the following supplements those requirements.
1. Electronic Document Submittal Service will be used for administration of the Contract. See Section 01 3000 - Administrative Requirements.
2. Contractor will be required to make submittals for every item and product so indicated; Also upon request, for any additional or other item or products intended for use or incorporation in the Work.
a. The Contractor shall submit to the Architect within 10 days of "Notice to Proceed", a complete listing of all required submittals, warranties, guarantees, close-out documents, and materials requiring extra, "maintenance" or "attic" stock delivered to the Owner, for review and acceptance. Include for each item, the anticipated date of Submittal to the Architect. Re-submit until accepted or approved.
3. The Contractor shall review, mark all necessary changes, revisions, and questions; and then stamp, sign, approve, and submit to the Architect, all Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, and shall do so with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner, or of separate contractors.
a. The Contractor shall not make submittals to the Architect which they have not reviewed, stamped, signed and approved by the Contractor; or in such case, no action will be taken by the Architect or their Consultants regarding that or those submittals.
4. Review time will be limited to one (1) week, except for more complex submittals, such as Structural elements and Divisions 21-26, which may require additional time to properly review.

5. Colors will not be selected until most or all submittals required have been received and reviewed. Actual color chip samples shall be required along with standard color selection paperwork. No exceptions.
6. Samples: Submit the number specified in Section 01 3000 - Administrative Requirements.
7. Submit test reports as required or otherwise requested, in the same manner as other submittal data.
8. Contractor shall provide a letter from the Mechanical Contractor stating the Mechanical Contractor has coordinated all powered requirement with the Electrical Contractor. Mechanical submittals will not be reviewed without receipt of the coordination letter.
9. Contractor shall distribute reviewed submittals to all concerned and appropriate Subcontractors and Suppliers.
10. Contractor shall provide access on-site to all reviewed and approved submittals.

B. Review and/or approval of submittals by the Architect, Owner and/or their Consultants shall not relieve the Contractor of his responsibility to comply with the requirements of the Contract Documents.
1. Any proposed change in the Work shall be submitted separate from any other item during construction, with same documentation as pre-bid requests, or they will not be considered.
2. No actual or proposed change shall be included in Shop Drawings or other Construction submittals, and none so included will be considered approved under any circumstances.
3. Shop Drawings are communications between the Contractor and various suppliers, fabricators, and subcontractors. The design professional's role is to review the drawings to answer questions that arise about design intent.
4. A reviewed Shop Drawing or Submittal with deviations from the original design intent illustrated in the Contract Documents, is NOT a Change Order, and does not constitute the Architect's or Owner's approval of the cost or time associated with the deviation. Changes to contract sum and/ or contract time may ONLY be achieved by fully executed Change Order.
5. Dimensions, quantities, and coordination remain solely the Contractor's responsibility.

C. Refer to Section 01 3000 - Administrative Requirements for additional information and requirements.

1.17 SITE MAINTENANCE

A. The Owner will require all mud or debris resulting from this construction to be removed from streets, sidewalks, etc., by the Contractor as it appears, one or more times daily.

B. Trash, debris, etc., must be removed from the site as Contractor's trash cans, waste receptacles, etc., are filled. Trash and Debris shall not be permitted to accumulate or blow around the site, within the buildings, etc.

C. The Contractor shall be responsible for maintaining existing landscaping and lawns within and below any construction fencing, for the duration of the Work of the Contract, or until any such fencing is removed.

D. Refer to Sections 01 1000 - Summary of the Work, 01 5000 - Temporary Facilities and Controls, 01 7000 - Execution and Closeout Requirements and other locations in the Bid and Contract Documents for additional information and requirements.

1.18 INSURANCE AND SPECIAL PROVISIONS

A. The Contractor and their insurer, by execution of the Contract, shall waive all rights of subrogation against "the Owner, the Architect, and their Consultants", and same shall be indicated on all insurance provided by the General Contractor and each Subcontractor.

B. The Contractor and their insurer, and each Subcontractor, shall name "the Owner, Architect, and their Consultants", as additional named primary insureds on all insurance provided by the

Contractor and each Subcontractor, except not for “Workers Compensation and Employers Liability”.

C. Refer to the “General Conditions of the Construction Contract” and other portions of the Bid and Contract Documents, for additional information and insurance requirements. Note that Builder’s Risk insurance is a requirement of the Contract.
   1. Extent of coverage required and/or any approval or acceptance of the insurance carried shall not act to modify the liability of the Contractor, nor to imply that the limits, features and/or coverages described are adequate to protect the interests or exposures of the Contractor.

D. The Contractor shall “hold harmless” and indemnify the Owner, Architect, and their Consultants from any claim or legal action resulting from any circumstances related to the Work of this project, including in part, payment of any legal or other expenses, fines, judgments, etc.

E. Insurance policies required by the Contract Documents shall not be canceled, altered, or changed, without first having given thirty (30) days written notice to the Owner, with a copy sent to the Architect, except ten (10) days written notice for non-payment of premium.
   1. Copies of all policies, endorsements, and insurance certificates, including new, renewed, altered, and/or changed during this Contract shall be delivered to the Owner within ten (10) days of effective date(s), with a copy sent to the Architect, by the Contractor.

F. Refer to "General Conditions of the Contract for Construction" for additional information and requirements regarding minimum insurance and indemnity requirements.

G. Special Provision: Nothing in this or other paragraphs of the Contract Documents shall create or give to third parties any claim or right of action beyond such as may legally exist irrespective of the Contract.

1.19 ACCESSIBILITY OF ALL COMPLETED WORK

A. All products and installations of the Work of this Contract, shall be as designed by the fabricator, manufacturer, etc., and installed by the Contractor, Subcontractors, etc., so as to provide full accessibility to people with disabilities, unless specifically indicated otherwise. This shall include in part, the following:
   1. Mounting heights of all electrical devices, switches, etc., all designated plumbing fixtures, and their operation, in all areas except mechanical and electrical rooms, and service areas which are not accessible at any time to the public or Owner’s administrative (not service or maintenance) personnel.
   2. Signage.
   3. Door operation and hardware.
   4. Slip resistance of all completed flooring and walkway surfaces both interior and exterior.

B. Comply with the more stringent requirements of at least the following, either the latest edition or latest adopted edition of the locality, and all revisions and amendments thereto:
   1. American National Standards Institute (ANSI), ANSI A 117.1.
   2. D.O.J. ADA Standards for Accessible Design.
   3. International Building Code, as applicable at the project locale.

1.20 CONTRACTOR PROGRAMS AND CONDUCT OF PERSONNEL

A. The Contractor shall implement programs and make literature available to all construction and administration personnel to ensure this project is a safe place to work. The project site shall, at all times, be free from illegal drugs, alcohol, and other substances that may contribute to injury or damage. Further, employees shall not be permitted on site if under the influence of illegal drugs, alcohol, or similar substances.
   1. The Contractor and every Subcontractor shall have as part of their personnel, safety, substance abuse prevention, and/or quality programs, mandatory drug testing at pre-employment, post-accident, and at random during employees’ tenure with their firms.

Each such entity shall be prepared to provide non-confidential verification to the Owner that such testing is consistently on-going, upon Owner's request.

B. Programs shall be acceptable to, or recommended by, one or more of the following:
   1. Contractor's Underwriter for Worker's Compensation or liability insurance.
   2. OSHA.
   3. Associated General Contractors.
   4. U.S. Department of Defense, Corps of Engineers, or Veterans Administration.

C. Conduct of all personnel employed for the Work of this project shall be held to a high standard and shall not be offensive to others on or around the site, including in part, pedestrians including students, the public, the Owner, Owner's Consultants, etc.
   1. Construction personnel shall be directed not to communicate with students or faculty in the vicinity of the project site. Any offensive dialogue or actions reported to the Owner may result in removal of the personnel from the project.
   2. The Contractor and their employees shall limit any discussion of the Work of this project to the Owner's representative named in the front of this Project Manual, inspecting authorities with jurisdiction, and the Architect. In no instance shall this project be discussed with others, except as may required for the successful performance of the work.

D. The Contractor shall immediately dismiss and escort off of the project site, any worker who is obviously under the influence of alcohol or other debilitating substance, and any personnel exhibiting offensive behavior as described above, by law, or by local statute or regulations of local authorities.

1.21 WORK BY OTHERS

A. The following items of work are to be provided by others, and are Not in Contract (N.I.C.). The Contractor will be required to coordinate with the Owner as necessary to accommodate provisions for these items.
   1. Movable furniture, furnishings, office equipment, IT equipment, AV equipment, voice/ data equipment, security equipment, access control equipment, and similar work excluded from the Contract Documents.
   2. Listed Equipment, residential appliances, items of Alternate work that are not accepted by Owner, work indicated "Not In Contract" (N.I.C.), work indicated as "Future", and/or similar items excluded from the Contractor's scope of work.
      a. Unless otherwise indicated, coordination, locating, and providing rough-ins for all power, water supply, gas, drains, drain lines, condensate drain outlet, and other utilities required for such equipment, casework, etc., including the preparation required for the installation of finishes indicated as "future", shall be included in Base Bid.

B. Refer to Section 01 1000 - "Summary of The Work" for additional information and requirements.

1.22 DEMOLITION

A. Section 02 4100 - "Demolition," is applicable to the entire Work of this project and not just to Division 2 where it occurs.

B. The demolition work may includes existing materials known to contain hazardous materials. See Section 02 4100 - Demoltion for requirements associated with the testing, identification, and remediation of hazardous materials, if present.

1.23 INSPECTIONS

A. See Section 01 3000 - Administrative Requirements for information on scheduling of Inspections, and minimum requirements for required inspections.

1.24 PERMIT AND INSPECTION FEES

A. This project will be administered by the Alabama Community College Facilities Division, with permitting and inspection services to be provided by the City of Huntsville, AL.
   1. The General Contractor shall review the "ACCS Manual of Procedures", available at https://www.accs.edu/facilities/, and become familiar with the requirements and procedures of the ACCS Facilities Division. The ACCS Facilities Division does not charge fees for administering ACCS projects.
   2. This project will not be administered by the Alabama Department of Construction Management (DCM). The DCM will not collect fees associated with this project, nor will it have a role in plan review, inspection, or contract administration.

1.25 PROJECT FUNDING

A. The funding for this project is to be administered through the Alabama Community College System. Pay Applications will be routed to the College that will operate the facility, and accounting thereafter will be coordinated between the College and the System office internally. The ACCS endeavours to process payment for properly submitted Pay Applications within thirty (30) days of receipt.

B. See the "General Conditions of the Contract for Construction" for additional requirements.

1.26 SUBSTANTIAL COMPLETION

A. 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. For substantial completion to be established, the punch list of incomplete items must be less than one page in length and contain only items that can reasonably be completed within 30 days. If punch list items and closeout documents are not completed within an additional 45 days of substantial completion, a Notice to Cure may be issued, at the Owner's discretion. 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.

END OF SECTION

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including Supplementary Conditions and Division 01 Specification sections apply to the work of this Section.

1.02 PROJECT IDENTIFICATION

A. General: The project name is "RSCC MIB Workforce Renovations" The project is located on a site owned by the Alabama Community College System (ACCS) at 100 AL-83, Evergreen, AL 36401. The facilities will be operated and maintained by Reid State Community College.

B. Owner: Alabama Community College System (ACCS).

C. Architect: Goodwyn Mills Cawood, LLC.

1.03 PROJECT SUMMARY

A. Abbreviated Written Summary: Briefly and without force and effect upon the contract documents, the Work of the Contract is summarized below.
   1. The Project consists of the renovation within the outlined project scope.
      a. Renovations to lab and academic spaces.
      b. Additions to existing spaces to grow additional lab and academic spaces.

1.04 PRIORITY AND UNIQUE PROJECT ELEMENTS AND CONDITIONS

A. The following items are some of the priority and unique aspects of this project. While the listing below is not all inclusive, it is intended to provide clear understanding to the General Contractor of the procedures and expectations with regard to constructing this project successfully.
   1. ACCS Responsibility for Code Compliance Procedures: Pursuant to ACT 2021-476 effective August 1, 2021, the ACCS Board of Trustees has adopted procedures to be followed on all construction projects. This project will not be administered, reviewed, or inspected by the Alabama Department of Construction Management (DCM). The project is required to comply with adopted State Building Codes and the rules and regulations administered by the State Fire Marshal. The General Contractor shall review the ACCS Manual of Procedures available under the Facilities tab of the ACCS website.
   2. Standard ACCS Forms: The General Contractor shall utilize standard ACCS forms as included herein and available at www.accs.edu/facilities. Do not use DCM Forms for this project.
   3. Existing Site Coordination: The existing site is on the Reid State Community College Campus. The General Contractor shall coordinate the work with the Owner to minimize disruptions to ongoing campus activities. See Section 02 4100 - Demolition, and the drawings for detailed requirements.
   4. Conduct of Personnel: The project site is adjacent to an operating college. The Contractor shall ensure the behavior of personnel on the project is appropriate and respectful of the ongoing adjacent operations.

1.05 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5000.01 - ACCS Form 2.A - Construction Contract.

1.06 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent buildings during the entire construction period.

B. Owner intends to occupy the Project by the date stated in the Agreement as the contract completion date.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.07 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: The Contractor shall have exclusive use of the site during the construction period as follows.
   1. The contractor shall confine operations at the site to the areas permitted under the Contract. Portions of the site outside of construction limits shall not be disturbed.
   2. Existing public roads and adjacent private roads that are off-site shall be kept clear and available at all times. These areas may not be utilized for construction parking, storage, without the express written consent of the municipality or private owner as applicable.
   3. Remove dirt, mud, debris, and other construction related debris from public and adjacent roadways and sidewalks as it occurs.
   4. Do not unreasonably encumber the site with materials or equipment. If off site storage is required, obtain and pay for such storage in a fully conded and insured facility acceptable to the Owner, with all stored items clearly identified as being assigned to this Project.
   5. Lock automotive and motorized construction vehicles when unattended. Do not leave vehicles unattended with motor running or ignition key in place.
   6. Construction equipment shall not come in contact with or swing over existing facilities to remain, public areas, occupied buildings, rights-of-way, etc. at any time.
   7. The Contractor, sub-contractors, and employees of both shall limit discussion of the Project to the Owner's Representatives, Consultants employed, inspecting authorities with jurisdiction, and the Architect. This project otherwise shall not be discussed with other parties.
   8. Smoking or use of any tobacco products is strictly prohibited on site, in or on the building during construction, and in the vicinity of any schools in the immediate area.
   9. Consumption or presence of alcohol tobacco, and/ or other debilitating substances is strictly prohibited on site, in or on the building during construction.
   10. Firearms are not permitted on site, in or on the building during construction, or in the vicinity of any schools in the immediate area.

B. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Existing building spaces may not be used for storage.

D. Utility Outages and Shutdown:
   1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   2. Prevent accidental disruption of utility services to other facilities.

E. Adjacent Construction Parking and Lay-Down Area
   1. The General Contractor, prior to occupying this site, shall meet with representatives of the Technical School to discuss access, security, and the condition of the site. The College may designate an area for the contractor to use for parking and/ or material laydown, however they are not obligated to do so and bidders shall not assume they will have use of any property that is on-site beyond the interior space being renovated.
   2. The General Contractor shall return the site of any temporary parking or storage areas to the Owner in equal or better condition to that prior to commencement of construction.

1.08 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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Goodwyn Mills Cawood

2400 5th Avenue South
Suite 200
Birmingham, AL 35233

T (205) 879-4462

www.gmcnetwork.com

Electronic File Conversion and Transfer Agreement

Goodwyn Mills Cawood, LLC. (GMC) in cooperation with its Consultants may, at its sole discretion, provide electronic document and file conversion services to the prime entity holding, or intending to enter into, an Agreement with an Owner for construction of a Project. GMC will typically accept only one request per project from one entity, typically the General Contractor.

Consultants referred to herein are all consultants to GMC for or in connection with the Project, including but not limited to those listed below.

It is acknowledged that neither GMC nor its Consultants are under any obligation to furnish electronic files to any party. The General Contractor and/or Sub-contractors should not, under any circumstances, assume they will receive any or all requested electronic files. Whether files are provided or not, the General Contractor remains completely responsible for performing all work required of the Contract Documents in full, including the preparation of accurate and detailed required shop-drawings.

When furnished, files will be transmitted electronically via FTP Site, or similar file transfer mechanism. It is the intent of GMC to furnish files in a timely manner, typically within two (2) weeks of receipt of payment of fees. However, the complexity and scale of the conversion is directly related to the requested file format and quantity of files requested. Where GMC believes a request will require additional time, we will notify the User and make reasonable effort to deliver files in phases if beneficial.

Please contact Alyssa Martin at (205) 879-4462 with any questions.

GOODWYN MILLS CAWOOD, LLC.

PROJECT

Project Name:

Project No.:

Document Issue Date:

Prime/Architect/Engineer: GOODWYN MILLS CAWOOD, LLC.

Consultants:

Goodwyn Mills Cawood, LLC. (hereafter "GMC"), for itself and its identified Consultants, hereby grants non-exclusive use of the requested electronic files to the party (User) listed below. User accepts that GMC and its Consultants reserve the right to convey or not convey electronic files at their sole discretion. User further agrees, as a precedent to transmittal of digital files to any other party, to require written agreement of equivalent confidentiality and indemnification provisions from any party that receives the digital files. The digital information furnished under this agreement is proprietary, is the property of GMC and/or its Consultants, and is protected by applicable copyright laws.

The information provided by GMC and/or its Consultants is solely for the convenience of the recipient. Neither GMC nor its Consultants make any warranty or guarantee, express or implied, as to the suitability of the files for any specific purpose. It is understood the files are (1) digital, (2) typically have been converted electronically into a format suitable to the User, (3) are inherently capable of being manipulated and altered through intentional and unintentional means, (4) are partial and therefore inherently incomplete representations of the Contract Documents, and (5) may include inaccuracies clarified elsewhere in the Contract documents. Consequently, ONLY the COMPLETE Printed Contract Documents, as amended, shall serve as the basis for the scope, quantity, and quality of the work required for the Project. Under no circumstances whatsoever shall GMC and/or its Consultants be or become liable to anyone for the accuracy or completeness of information included in requested electronic files. The burden of, and responsibility for, determining the fitness of data included in electronic files falls solely and completely on the User.

LIMITED USE: The use of any digital file(s) is solely limited to the listed Project below. In no event shall files be utilized for any other Project, or any use beyond the use specifically listed herein. Further, under no circumstances may the General Contractor or and Sub-Contractor submit files furnished under this Agreement as required shop drawing submittals. By execution of this Agreement, the User acknowledges these limitations, and shall comply fully therewith.

CONFIDENTIALITY: User agrees to hold Project information strictly confidential, and User agrees it shall limit the use of transmitted electronic files solely to those applications necessary to perform work required for the Project.

INDEMNIFICATION: User hereby agrees to indemnify, defend, and hold harmless GMC, its directors, officers, and employees, and its Consultants, Consultant's directors, Consultants officers and employees, and the insurers, agents, and affiliates of both GMC and its Consultants, from any and all liability including claims for consequential damages or attorney's fees that may arise out of or relate in any matter to the authorized or unauthorized use, reuse, or alteration of this information by User, its employees or agents, vendors, contractors, sub-contractors, or any other party.

REVISIONS: The Contract Documents are subject to change, and revisions are not always incorporated throughout the documents. It is the User's sole responsibility to review the complete current Contract Documents, and identify inconsistencies between the electronic files and the current Contract Documents.

DIGITAL PROTOCOL: The USER is solely responsible for examination of digital files for virus contamination. Neither GMC nor its Consultants, or the directors, officers, employees, insurers, agents, or affiliates of either are responsible for damages incurred due to virus contamination, or for software version and/or file compatibility, or any similar hardware or software compliance issues.

FEE STRUCTURE: Prior to conversion of files, GMC must receive this complete Electronic File Conversion and Transfer Agreement, completed in full, and executed by a representative of the User with authorization to enter into contracts on behalf of the User.

			PER SHEET FEE
Civil	C		$125
Architecture	A		$150
Structural	S		$125
Mechanical	M, P, FP		$125
Electrical	E		$125
Acoustical & AV	AV		$125
Other	G, FS, etc.		$100

USER ACCEPTANCE OF AGREEMENT

Company Name: _____

By: _____ Date: _____

Its: _____

REQUESTED FILE FORMAT

User (Select ONE)	File Format
☐	Bound Auto CAD Release 2007
☐	Bound Auto CAD Release 2010
☐	Bound Auto CAD Release 2013
☐	Bound Auto CAD Release 2018

SCHEDULE OF REQUESTED FILES (To be filled by User)

SHEET		INTENDED USE		FEE	
No.	Name				

(PRINT ADDITIONAL FORMS AS REQUIRED)

SECTION 01 2100
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash allowances.

B. Contingency allowance.

C. Unit Price allowances.

D. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including Supplementary Conditions and Division 01 Specification sections, apply to the work of this Section.

B. Section 01 2200 - Unit Prices: Unit Price item descriptions.

C. Section 01 2900 - Payment Procedures: Additional payment and modification procedures.

D. Specification Sections associated with Allowance Items.

1.03 DESCRIPTION OF REQUIREMENTS:

A. Definitions and Explanations: Certain requirements of the work related to each allowance are shown and specified in contract documents. The allowance has been established in lieu of additional requirements for that work, and further requirements thereof (if any) will be issued by change order.

B. Types of allowances scheduled herein for the work include the following:
   1. Lump sum allowances.
   2. Unit cost allowances.

C. Selection and Purchase:
   1. At earliest feasible date after award of Contract, advise Architect/Engineer of scheduled date when final selection and purchase of each product or system described by each allowance must be accomplished in order to avoid delays in performance of the work.
   2. As requested by the Architect/Engineer, obtain and submit proposals for the work of each allowance for use in making final selections; include recommendations for selection which are relevant to the proper performance of the work.
   3. Purchase products and systems as specified, and as selected (in writing) by the Architect/Engineer.
   4. Submit proposals and recommendations, for purchase of products or systems of allowances, in form specified for change orders.

D. Change Order Data: Include in each change order proposal both the quantities of products being purchased and unit costs, along with total amount of purchases to be made. Where requested, furnish survey-of-requirements data to substantiate quantities. Indicate applicable delivery charges, amounts of applicable trade discounts, and other relevant details as requested by the Architect.
   1. Each change order amount for allowances shall be based on the unit price difference between the actual purchase amount and the allowance, multiplied by the final measure or count of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections and similar margins.
   2. Include overhead and profit in the Contractor's Allowance.
   3. When requested, prepare explanations and documentation to substantiate the quantities, costs, and margins as claimed.

E. Change Order Mark-Up:

1. Except as otherwise indicated, comply with provisions of the General Conditions. For each allowance, Contractor's claims for increased costs (for either purchase amount or Contractor's handling, labor, installation, overhead, and profit), because of a change in scope or nature of the allowance work as described in contract documents, must be submitted within 60 days of initial change order authorizing work to proceed on that allowance; otherwise, such claims will be rejected.
2. Where it is not economically feasible to return unused material to the manufacturer/supplier for credit, prepare unused material for the Owner's storage, and deliver to the Owner's storage space as directed. Otherwise, disposal of excess material is the Contractor's responsibility.

F. Time and Allowance Amounts:
1. Nothing in the Bid or Contract Documents shall be so construed or interpreted as to provide a Contract time extension, due to use or non-use of any Allowance amount.
2. Nothing in the Bid or Contract Documents shall be so construed or interpreted as to allow unused Allowances or any portion thereof, nor any overhead and profit therefor to be retained by or paid to the Contractor.
   a. Full amount of unused allowances shall be returned to the Owner.

1.04 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts, less applicable taxes.

B. Costs Not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing. Associated Overhead and Profit shall be included in the Base Bid rather than the Allowance, unless specifically directed otherwise in the Allowance Schedule herein .

C. Architect Responsibilities:
1. Consult with Contractor for consideration and selection of products, suppliers , and installers.
2. Select products in consultation with Owner and transmit decision to Contractor.
3. Prepare Change Order.

D. Contractor Responsibilities:
1. Assist Architect in selection of products, suppliers , and installers.
2. Obtain proposals from suppliers and installers and offer recommendations.
3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.

F. At project Closeout, funds remaining in Cash Allowances will be credited to Owner by Change Order.

1.05 CONTINGENCY ALLOWANCE

A. Costs Included in Contingency Allowances: Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.06 UNIT PRICE ALLOWANCES

A. See Section 01 2200 - Unit Prices for procedures and requirements associated with Unit Price based Allowances.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF LUMP SUM ALLOWANCES

A. **Allowance No. 01 - BRICK VENEER MASONRY (Cash Allowance)**
1. Clay Facing Brick Veneer: Allow a unit price of FIVE HUNDRED DOLLARS ($500) PER THOUSAND for clay brick units, to include material purchase and delivery to the job site.
2. See Section 04 2000 - Unit Masonry for requirements.
3. Installation of the brick masonry shall be included in the Base Bid, and not a part of the Allowance.
4. The material purchase and installation of mortar, grout, reinforcing, anchorage, flashings, and all associated accessories shall be included in Base Bid, and not as part of Allowance.
5. Concrete masonry units (CMU), mortar, installation, and installation materials (grout, ties, reinforcing, etc.) shall be in Base Bid, and not as part of Allowance.
6. Include overhead and profit in Base Bid and not as part of Allowance.

B. **Allowance No. 02 - INTERIOR WALL GRAPHICS (Cash Allowance)**
1. Allow a lump sum price of THIRTY THOUSAND DOLLARS ($30,000) for interior wall graphics, including purchase, applicable taxes, delivery to job site, and installation. Selections, graphic design, and copy (text) will be furnished by Architect after bidding.
2. This Allowance if for large scale wall graphics and exterior building signage only. Interior and Exterior Signage that is illustrated in specifications and on Drawings shall be included in the Base Bid, and not as part of Allowance.
3. Include overhead and profit in Base Bid and not as part of Allowance.

C. **Allowance No. 03 - EMERGENCY RESPONDER RADIO COVERAGE SYSTEM (Cash Allowance)**
1. Allow a lump sum price of ONE HUNDRED-THOUSAND DOLLARS ($100,000) for work associated with the purchase and installation of an Emergency Responder Radio Coverage System if found to be required after testing of the facility.
2. See Section 28 7800 - Emergency Radio Responder Coverage System for requirements. Costs associated with testing to identify if the system is required shall be included in the Base Bid, and NOT as part of Allowance.
3. Include overhead and profit in Base Bid and not as part of Allowance.

D. **Allowance No. 04 - LIMITED AID TO CONSTRUCT (Cash Allowance)**
1. Allow a lump sum price of ONE-HUNDRED THOUSAND DOLLARS ($100,000) for the aid to construct cost of site utility work specifically related to paying local utility providers charges associated with utility improvements and aid to construction costs.
2. All utility work called for and required in Section 33 1000 - Water Utilities, Section 33 3000 - Sanitary Sewerage Utilities, and Division 26 - Electrical shall be included in the Base Bid, and NOT as part of Allowance.
3. Include overhead and profit in Base Bid and not as part of Allowance.

E. **Allowance No. 05 - CONTINGENCY (Contingency Allowance)**
1. Allow a lump sum price of ONE HUNDRED THOUSAND DOLLARS ($100,000) as a Contingency Allowance.

2. Include overhead and profit in Base Bid and not as part of Allowance.

F. **Allowance No. 06 - PERMANENT CORES AND KEYS (Cash Allowance)**
1. Allow a lump sum price of TWENTY THOUSAND DOLLARS ($20,000) for work associated with the purchase and delivery of permanent cylinder cores and keys.
2. See Section 08 7100 - Dood Hardware for requirements.
3. Provide each core with one operating key. New key system shall include five (5) master keys per master key group created, two (2) permanent control keys and five (5) grand master keys and one-hundred (100) blanks.
4. Installation of the permanent cores, including installation material costs, shall be included in the Base Bid, and not as part of Allowance.
5. Include overhead and profit in Base Bid and not as part of Allowance.

3.02 SCHEDULE OF UNIT PRICE ALLOWANCES

A. **Allowance No. 07 - 30A BUSWAY CONNECTIONS**
1. In accordance with Section 01 2200 - Unit Prices and Division 26 - Electrical, include an Allowance for the quantity identified for additional bus-duct connections that may be required beyond those connections called for in the drawings and Specifications. Connections illustrated in the drawings and specified herein shall be included in the Base Bid, not as part of Allowance. The Allowance value will be adjusted up or down based on the actual quantity of the Work.
2. See Section 01 2200 - Unit Prices for costs to be included and procedures for payment of Unit Price work.
3. Calculating Allowance No. 10:
   a. Unit Price Item A: 30A Busway Connections
   b. Quantity of TEN (10) Each (EA)
   c. Unit Price for each Connection $_____.
   d. Total Allowance No. 10 Value (b x c): $ _____.

B. **Allowance No. 08 - 60A BUSWAY CONNECTIONS**
1. In accordance with Section 01 2200 - Unit Prices and Division 26 - Electrical, include an Allowance for the quantity identified for additional bus-duct connections that may be required beyond those connections called for in the drawings and Specifications. Connections illustrated in the drawings and specified herein shall be included in the Base Bid, not as part of Allowance. The Allowance value will be adjusted up or down based on the actual quantity of the Work.
2. See Section 01 2200 - Unit Prices for costs to be included and procedures for payment of Unit Price work.
3. Calculating Allowance No. 11:
   a. Unit Price Item B: 60A Busway Connections
   b. Quantity of TEN (10) Each (EA)
   c. Unit Price for each Connection $_____.
   d. Total Allowance No. 11 Value (b x c): $ _____.

C. **Allowance No. 09 - UNDERCUT AND BACKFILL IN BUILDING CONTROL AREA**
1. In accordance with Section 01 2200 - Unit Prices and Section 31 2000 - Earth Moving, include an Allowance for the quantity identified. The Allowance value will be adjusted up or down based on the actual quantity of the Work.
2. See Section 01 2200 - Unit Prices for costs to be included and procedures for payment of Unit Price work.
3. Calculating Allowance No. 12:
   a. Unit Price Item C: Undercut and Backfill in Building Control Area
   b. Quantity of TWO HUNDRED AND FIFTY (250) Cubic Yards (CY)
   c. Unit Price for each CY $_____.

d. Total Allowance No. 12 Value (b x c): $ _____.

D. **Allowance No. 10 - UNDERCUT AND BACKFILL IN PAVEMENT CONTROL AREA**
1. In accordance with Section 01 2200 - Unit Prices and Section 31 2000 - Earth Moving, include an Allowance for the quantity identified. The Allowance value will be adjusted up or down based on the actual quantity of the Work.
2. See Section 01 2200 - Unit Prices for costs to be included and procedures for payment of Unit Price work.
3. Calculating Allowance No. 13:
   a. Unit Price Item D: Undercut and Backfill in Pavement Control Area
   b. Quantity of TWO HUNDRED AND FIFTY (250) Cubic Yards (CY)
   c. Unit Price for each CY $_____.
   d. Total Allowance No. 13 Value (b x c): $ _____.

E. **Allowance No. 14 - ASPHALT PAVEMENT - FULL DEPTH**
1. In accordance with Section 01 2200 - Unit Prices and Section 32 1216 - Asphalt Pavement, include an Allowance for the quantity identified of additional Asphalt Paving that may be required beyond that called for in the drawings and Specifications. Asphalt Paving illustrated in the drawings and specified herein shall be included in the Base Bid, not as part of Allowance. The Allowance value will be adjusted up or down based on the actual quantity of the Work.
2. See Section 01 2200 - Unit Prices for costs to be included and procedures for payment of Unit Price work.
3. Calculating Allowance No. 14:
   a. Unit Price Item E: Asphalt Pavement - Full Depth
   b. Quantity of FIVE HUNDRED (500) Square Yards (SY)
   c. Unit Price for each SY $_____.
   d. Total Allowance No. 14 Value (b x c): $ _____.

END OF SECTION

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SECTION 01 2200
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including Supplementary Conditions and Division 01 Specification sections, apply to the work of this Section.

B. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.

C. Section 01 2100 - Allowances: Allowance items associated with Unit Prices.

D. Section 01 2900 - Payment Procedures: Additional payment and modification procedures.

E. Specification Sections associated with Unit Price items.

1.03 DEFINITIONS AND GENERAL REQUIREMENTS

A. A Unit Price is an amount proposed by Bidders and stated in Attachment A to Proposal Form as a price per unit of measure for materials and/ or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantity of work required of the contract documents is increased or decreased per the General Conditions and/ or other provisions of the Bid and Contract Documents.

B. The scheduled items of work are anticipated during construction but the exact quantity may not be determined prior to bidding. The Contractor shall include in the Lump Sum Base and/ or Alternate Bid (as applicable) an allowance for the listed items in the quantities indicated on Attachment A. Allowance Unit Prices include, but are not limited to, all charges for labor, materials, equipment, shoring, layout, supervision, general expenses, fees, taxes, insurance, bonds, overhead and profit, etc. required to accomplish the allowance item. Where quantities of same items of work are defined and are quantified elsewhere in the bid documents, the allowance quantities indicated herein shall be **in addition to those which are indicated**. For example, if the grading plan indicated existing and new grades, the bidder shall compute the quantity of earthwork required and include that quantity of work in the bid as if no allowance were specified. If an additional allowance quantity of earthwork is stipulated, that stipulated allowance quantity shall also be included in addition to the quantity computed by the bidder's takeoff of the grading plan.

C. Unit Prices quoted by the Contractor shall apply to increases and/ or decreases to the quantities included in Base or Alternate Bid amounts.

D. The Owner reserves the right to reject the Contractor's measurement of work in-place and engage a third party that is acceptable to the Contractor to measure in-place work at the Owner's expense.

1.04 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.05 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.06 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

C. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.

D. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

E. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

F. Measurement by Area: Measured by square dimension using mean length and width or radius.

G. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

H. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.07 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.08 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
   2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.

C. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of Architect to assess the defect and identify payment adjustment is final.

1.09 SCHEDULE OF UNIT PRICES

A. Item A - 30A Busway Connection; Division 26 - Electrical.
   1. Description: Include all costs associated with furnishing and installing a 30A 3-Phase Connection to Busway with 30/3, F30 Bus Plug at Busway with twenty (20) feet of 3#10 & #10G "SOW" cord and 30 amp, 3-Phase Metric decontactor series receptacle in accordance with Specification Division 26 - Electrical and as illustrated on the drawings.
   2. Unit of Measure: Quantity Each (EA).

B. Item B - 60A Busway Connection; Division 26 - Electrical.
   1. Description: Include all costs associated with furnishing and installing a 60A 3-Phase Connection to Busway with 60/3, F60 Bus Plug at Busway with twenty (20) feet of 3#6 & #10G "SOW" cord and 60 amp, 3-Phase Metric decontactor series receptacle in accordance with Specification Division 26 - Electrical and as illustrated on the drawings.
   2. Unit of Measure: Quantity Each (EA).

C. Item C - Undercut and Backfill in Building Control Area; Section 31 2000 - Earth Moving.
   1. Description: Undercutting below planned sub-grade in building control areas, and at least ten (10) feet laterally beyond, as required due to careful inspection by probing, proof-rolling, and testing. The Allowance scope of work is for undercutting and backfilling that is beyond and in addition to all undercutting/ backfill that is required by the Drawings and Specifications. Work shall be paid on a unit price basis per cubic yard of undercut. Unit prices shall include excavation and legal off site disposal of unsuitable material and replacement with controlled back fill in cuts back to original grade in lifts compliant with Section 31 2000 - Earth Moving. This provision does not apply to previously prepared areas of the site that become unsuitable due to construction traffic, construction stormwater management or rainfall, not does it apply to areas that are made unsuitable due to construction sequencing that adversely affects proper drying of the building pad.
   2. Unit of Measure: Cubic Yard (CY).

D. Item D - Undercut and Backfill in Pavement Control Area; Section 31 2000 - Earth Moving.
   1. Description: Undercutting below planned sub-grade in pavement control areas, and at least five (5) feet laterally beyond, as required due to careful inspection by probing, proof-rolling, and testing. The Allowance scope of work is for undercutting and backfilling that is beyond and in addition to all undercutting/ backfill that is required by the Drawings and Specifications. Work shall be paid on a unit price basis per cubic yard of undercut. Unit prices shall include excavation and legal off site disposal of unsuitable material and replacement with controlled back fill in cuts back to original grade in lifts compliant with Section 31 2000 - Earth Moving. This provision does not apply to previously prepared areas of the site that become unsuitable due to construction traffic, construction stormwater management or rainfall, not does it apply to areas that are made unsuitable due to construction sequencing that adversely affects proper drying.
   2. Unit of Measure: Cubic Yard (CY).

E. Item E - Asphalt Paving - Full Depth; Section 32 1216 - Asphalt Paving.
   1. Description: Include all coast for furnishing and installing the full depth section Asphalt Pavement beyond the scope of paving required by the drawings and Specifications, including Section 32 1216 - Asphalt Paving. The Base Bid shall include all paving required by the Contract Documents. Work shall be paid on a unit price basis per square yard of paving. This provision does not apply to previously paved areas that become damaged due to construction traffic or construction stormwater management or rainfall.
   2. Unit of Measure: Square Yard (SY).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including Supplementary Conditions and Division 01 Specification sections, apply to the work of this Section.

B. Section 01 2100 - Allowances, for cash allowances affecting this section.

C. Section 01 2500.01 - Substitution Request Form: Required form to be used for substitution requests.

D. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.

E. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

B. Substitutions: See General Conditions of the Construction Contract for definition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

1. Forms included in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
   1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

B. Submittal Form (before award of contract):
   1. Submit substitution requests by completing the form in Section 01 2500.01 - Substitution Request Form; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.
   1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.04 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

SECTION 01 2500.01
SUBSTITUTION REQUEST FORM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. GMC Substitution Request Form to be utilized for ALL requests for substitutions.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including Supplementary Conditions and Division 01 Specification sections, apply to the work of this Section.

1.03 LISTED DOCUMENTS

A. GMC Substitution Request Form.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

Attn: _____ A/E Project No.: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page and Paragraph: _____

Proposed Substitution: _____

Trade Name: _____

Manufacturer: _____ Model No.: _____

Mfg. Address _____ City, State, zip: _____ Phone: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the date are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____ E-mail: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specifications, Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specifications Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

INCOMPLETE INFORMATION WILL BE GROUNDS FOR REJECTION

SECTION 01 2900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.03 DEFINITIONS

A. Schedule of Values: A statement acceptable to the Owner and Architect furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.04 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with Continuation Sheets.
      b. Submittals Schedule.
      c. Contractor’s Construction Schedule.
   2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual Table of Contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Contractor's name and address.
      c. Date of submittal.
   2. Submit draft of Schedule of Values that will accompany Application for Payment.
   3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.
      b. Description of the Work.
      c. Name of subcontractor.
      d. Name of manufacturer or fabricator.
      e. Name of supplier.
      f. Change Orders (numbers) that affect value.
      g. Dollar value.
         1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
   4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual Table of Contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for Operation and Maintenance Manuals, Punch List activities, Project Record Documents, and Demonstration and Training in the amount of 5 percent of the Contract Sum.
   5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.05 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by approving authority and paid for by Owner.
   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use Application and Certificate for Payment form stipulated in front-end documents as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Approving authority will return incomplete applications without action.
   1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit ONE (1) signed and notarized original copy of each Application for Payment to Architect by a method ensuring receipt within 24 hours. Required attachments shall be transmitted simultaneously.
   1. Transmit Application for Payment with a transmittal form listing attachments and recording appropriate information about the application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
   1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
   2. When an application shows completion of an item, submit final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.
16. Initial settlement survey and damage report if required.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Contractor's Affidavits of Payment of Debts and Claims, Release of Liens, and Consent of Surety to Final Payment.
5. Evidence that claims have been settled.
6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
7. Retainage:
    a. Article 29 - Progress Payments. Modify item E. Retainage, 2. to read as follows:
    b. (2) "Retainage" is defined as that money belonging to the contractor which has been retained by ACCS conditioned on final completion and acceptance of all work in connection with a project or projects by the contractor. Retainage not be reduced. Full retainage will only be released with the final payment after completion of all

punch list items, receipt of Certificate of Occupancy from AHJ, submittal of all warranties, releases of claims are received, surety consent to final payment received, submittal of record documents and all other closeout documents required by contract. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected work.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Coordination
B. Electronic document submittal service (REQUIRED).
C. Requests For Information.
D. Preconstruction meeting.
E. Progress meetings.
F. Submittals for review, information, and project closeout.
G. Number of copies of submittals.
H. Submittal procedures (Including Submittal Numbering/Tracking Guide and form for Transmittal).
I. Inspections.

1.02 RELATED REQUIREMENTS

A. Section 01 0150 - Special Conditions: Additional Administrative and Submittal Requirements.
B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 PROJECT COORDINATION

A. Project Coordinator: Contractor's Project Manager.
B. Cooperate with the Owner and Architect in allocation of mobilization areas of site; for field offices and sheds, for traffic, and parking facilities.
C. During construction, coordinate use of site and facilities through the Owner and Architect.
D. Comply with Owner and Architect's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
E. Comply with instructions of the Owner and Architect for use of temporary utilities and construction facilities.
F. Coordinate field engineering and layout work under instructions of the Owner and Architect.
G. Make the following types of submittals to Architect:
    1. Schedule of Submittals.
    2. Requests for interpretation.
    3. Requests for substitution.
    4. Shop drawings, product data, and samples.
    5. Test and inspection reports.
    6. Design data.
    7. Manufacturer's instructions and field reports.
    8. Applications for payment and change order requests.
    9. Progress schedules.
    10. Coordination drawings.
    11. Correction Punch List and Final Correction Punch List for Substantial Completion.
    12. Closeout submittals.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Contractor and Architect are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.

C. Submittal Service: The selected service is:
   1. Procore | Construction Management (tel: 1-866-477-6267): www.procore.com

D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 REQUEST FOR INFORMATION

A. All Pre-Bid Questions, or Requests for Information must be submitted through a prequalified General Contractor via email to the Architect's Project Manager, with a copy to Kayla Thomas (kayla.thomas@gmcnetwork.com). Pre-Bid Questions will be accepted up to 48 hours prior to Bid Opening.

B. Send requests for information (RFI's) to Architect's Project Manager and administrative assistant, following the example form included at the end of this section.

C. Sequentially number the Requests for Information (RFI), and date accordingly.

D. Explanations and interpretations will be issued via Addendum.

E. After award of the Bid, a Request for Information (RFI), when submitted to the Architect, may result in an Architect's Supplemental Instruction (ASI), Request for Proposal (RFP), or Construction Change Directive (CCD) prior to the issuance of a Change Order.

3.03 PRECONSTRUCTION CONFERENCES

A. Prior to commencing any work on the project, a pre-construction conference shall be held. Mandatory attendance will be required of the General Contractor and representative of all specialty and principal subcontractors involved in the project. Time and date of said conference shall be established by the Architect after award of construction contract.

B. A Pre-Construction meeting shall not be conducted until both (1) the permit fee and (2) the signed Construction Contract have been received by the Owner.Division of Construction Management

C. Architect will schedule a meeting after Notice of Award.

D. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

E. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties to Contract and Architect.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.
   8. Other items: To be announced.

F. Similarly, prior to commencing any major portion of the Work of the project, preconstruction conferences shall be held. Mandatory attendance will be required of the General Contractor and representative of all specialty and principal subcontractors involved in the individual major portions of project. Time and date of said conferences shall be established by the General Contractor, and the Architect, Owner, and appropriate Consultants shall be advised in writing of times and dates, by the General Contractor.
   1. “Major portion” may be defined as work items for each Subcontractor working on site, and shall include in part, but not be limited to, earthwork, sitework, site utilities, concrete work, masonry, Division 5, roof framing and Division 6, insulation, roofing systems, finishes, specialties, casework, mechanical, plumbing, and electrical.

G. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Construction Manager shall schedule and administer meetings throughout progress of the Work at maximum monthly bi-weekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. The Contractor shall record minutes and distribute copies within two days after meeting to participants through the electronic document submittal service, .

D. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.

4. Contractor's superintendent.
5. Major subcontractors.

E. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

3.05 COORDINATION DRAWINGS

A. Submit Coordination Drawings of the primary above ceiling systems including primary structural elements, plumbing systems, mechancal systems, and fire protection systems. This project includes the addition of a fire sprinkler system, and it is imperative that the design of the systems above ceilign be coordinated to assure scheduled ceiling heights are achieved.

B.

C. Review drawings prior to submission to Architect.

3.06 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect, using the submittal numbering tracking system, for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.07 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.08 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.09 NUMBER OF COPIES OF SUBMITTALS (WHEN ELECTRONIC DOCUMENT SUBMITTAL SERVICE IS USED)

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

C. Samples: Submit no less than 3-each of any sample or color chart which is required or otherwise requested, unless more are required in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

D. Refer to Section 01 0150 - "Special Conditions" for additional information and requirements.

3.10 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a separate transmittal for each item.
   2. Use a single transmittal for related items.
   3. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
   7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Deliver submittals to Architect at business address.
      b. Upload submittals in electronic form to Electronic Document Submittal Service website.
   8. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
      b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.

c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.

9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
10. Provide space for Contractor and Architect review stamps.
11. When revised for resubmission, identify all changes made since previous submission.
12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
14. Submittals not requested will not be recognized or processed.

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Submit concurrently with related shop drawing submittal.
3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

E. Transmit each submittal with approved form.

F. Transmit each submittal. Sequentially number each transmittal form according to the example shown on the sample Transmittal form provided at the end of this Section. Include the date, project number and name along with number of copies submitted.

G. Deliver submittals to Architect at business address to the attention of the Contract Administration Coordinator.

H. A Submittal Schedule must be submitted and approved by Architect prior to review of any and all submittals.

3.11 SCHEDULING OF INSPECTIONS

A. The General Contractor shall contact the Local Authority Having Jurisdiction to schedule required inspections, and shall notify the Owner and Architect simultaneously of said request.

B. Inspections should typically be requested fourteen (14) days in advance.

C. After Building Inspector notifies the General Contractor of date and time of inspection, the General contractor shall notify Architect and Owner.

D. Cancellations of any scheduled inspection must be received in writing by email no less than 48 hours prior to the scheduled inspection. The email shall be sent to the Contractor, Building Inspector, and Owner. If an inspection is cancelled, it will be rescheduled subject to Building Inspector's availability and may result in additional fees.

3.12 MINIMUM REQUIREMENTS FOR REQUIRED INSPECTIONS

A. Use the following minimum requirements to help determine if a project is ready for required inspection:

B. PRE-CONSTRUCTION CONFERENCE.

1. Required Attendees: Contractor, Owner, Architect, Major Subcontractors.
2. Inspection Requirements:
   a. Signed construction contract.
   b. Verification of payment of permit fee.
   c. Contractor's Statement of Responsibility and Quality Assurance Plan (for storm shelter).
   d. Fire Alarm Contractor's Certification (from State Fire Marshall).
   e. ADEM permit, if more than 1 acre of land is disturbed.

C. PRE-ROOFING CONFERENCE.
1. Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative.
2. Inspection Requirements:
   a. Roofing submittals must be approved by Architect prior to pre-roofing conference.
   b. Roofing manufacturer must provide documentation that roof design and roofing materials meet code requirements for wind uplift and impact resistance.
   c. Copy of sample roofing warranty.

D. ABOVE-CEILING INSPECTION.
1. Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors.
2. Inspection Requirements:
   a. All work must be completed except for installation of ceiling tiles and/or hard ceilings.
   b. Space must be conditioned.
   c. Permanent power must be connected unless otherwise arranged with the Inspector.
   d. Grease duct must be inspected and approved by the Inspector prior to fire wrapping and Above-Ceiling Inspection.

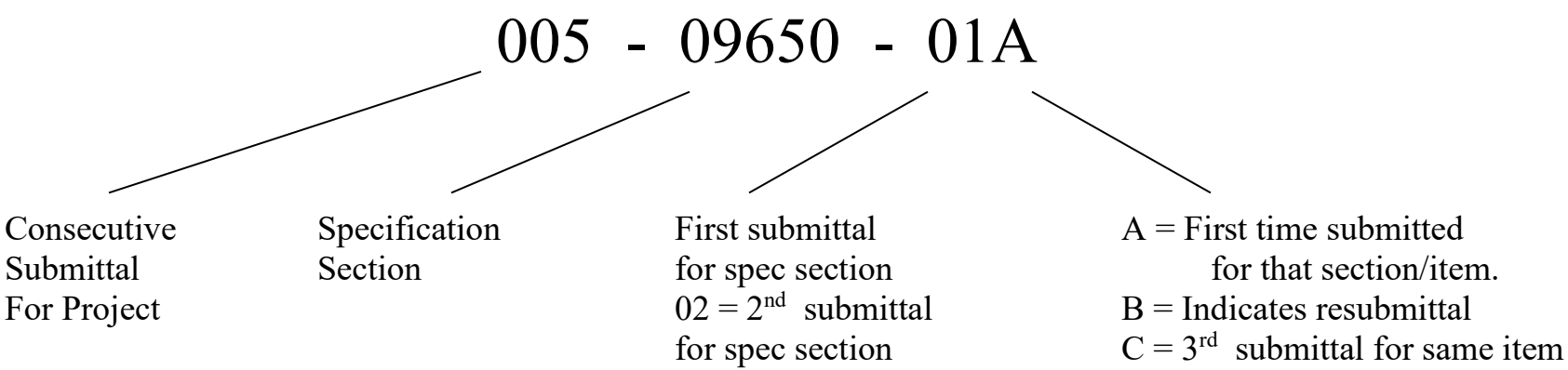
E. LIFE SAFETY INSPECTIONS AND FINAL INSPECTIONS.
1. Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshall.
2. Inspection Requirements:
   a. Fire alarm certification.
   b. Kitchen hood fire suppression system certification.
   c. General Contractor's 5-Year Roofing Warranty (ACCS Form 6-L).
   d. Roofing manufacturer's guaranty.
   e. Above ground and below ground sprinkler certifications.
   f. Completed Certificate of Structural Engineers Observations for storm shelters.
   g. Emergency and exit lighting tests.
   h. Fire alarm must be monitored.
   i. Elevator Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor.
   j. Boiler/Vessels Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor.
   k. Flush test for underground sprinkler lines (witnessed by local fire marshall, fire chief and/or Inspector).
   l. Flush/pressure test for new and/or existing fire hydrants.
   m. Must have clear egress/access and emergency (for first responders) access to building.
   n. Must have ADA access completed.

F. YEAR-END INSPECTIONS.

1. Required Attendees: Contractor, Owner, Architect, Engineers and/or Major subcontractors may also be required to attend.
2. Inspection Requirements:
   a. Owner's list of documented warranty items.

END OF SECTION

SUBMITTAL NUMBERING / TRACKING



***

INCLUDE ARCHITECT'S PROJECT NUMBER ON ALL SUBMITTAL TRANSMITTALS

**** Architect's Project No. & Name: ABHM260005 – MIB RENOVATION**
for Reid State Technical Community College
Evergeen, Alabama

REQUEST FOR INFORMATION

RFI No. _____

DATE: _____ PROJECT NAME: _____

GM&C PROJECT No._____

FROM: _____ PROJECT MANAGER: _____

_____ GOODWYN MILLS CAWOOD, LLC.

_____ 2400 Fifth Avenue South, Suite 200

_____ Birmingham, AL 35233

REQUEST:

SIGNATURE: _____

SUGGESTION:

RESPONSE: ROUTING:_____ DATE REC'D: _____

SIGNATURE: _____ DATE RET'D: _____

DISTRIBUTION: O Contract Administrator O Consultant O _____ O _____ O _____

*** SEND THIS FORM TO THE CONTRACT ADMINISTRATION COORDINATOR ***

TRANSMITTAL

No. _____

DATE: _____ PROJECT: _____

GM&C PROJECT No. _____

FROM: _____ PROJECT MANAGER: _____

_____ GOODWYN MILLS CAWOOD, LLC.

_____ 2400 Fifth Avenue South, Suite 200

_____ Birmingham, AL 35233

Shop Drawing / Submittal No. (see example below) Description

Copies	Submittal Number	Description

RESPONSE: ROUTING: _____ DATE REC'D: _____

SIGNATURE: _____ DATE RET'D: _____

Shop Drawing / Submittal Number Example 005 - 09650 - 01A

- 005 — Consecutive submittal for Project
- 09650 — Specification Section
- 01 — First submittal for spec section; 02 = 2nd submittal for spec section
- A — A = First time submitted for that section/item.; B = Indicates resubmittal; C = Third submittal for same item

*** SEND THIS FORM TO THE CONTRACT ADMINISTRATION COORDINATOR ***

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections apply to this Section.

B. 00 5000.11 - Sample Progress Schedule and Report.

C. Section 01 1000 - Summary: Work sequence.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; 2016, with Addendum (2021).

1.04 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Submit updated schedule with each Application for Payment.

D. Submit in PDF format.

1.05 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.06 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Provide sub-schedules to define critical portions of the entire schedule.

E. Include conferences and meetings in schedule.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

H. Indicate delivery dates for owner-furnished products.

I. Provide legend for symbols and abbreviations used.

J. Show total float for each construction activity.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. Testing and inspection agencies and services.

D. Control of installation.

E. Tolerances.

F. Manufacturers' field services.

G. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 4223 - Reference Standards and Definitions.

C. Section 01 4533 - Code Required Special Inspections.

D. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2026.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2025.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2026.

G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: For integrated exterior and interior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components.
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

D. Schedule of Submittals.

E. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

F. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

G. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
   2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

H. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

I. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

J. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

K. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
3. Laboratory: Authorized to operate in the State in which the Project is located.
4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

D. Refer to Section 01 0150 - "Special Conditions" for additional information and requirements.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Price.

F. Refer to Section 01 0150 - "Special Conditions" for additional information and requirements.

3.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

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SECTION 01 4100

STRUCTURAL TESTS AND 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.

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. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the construction document requirements.
3. Requirements for contractor to provide quality-assurance and -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.

D. Related Sections include but are not limited to the following:

1. Section 0 22000 - “Earthwork”
2. Section 03 3100 - “Cast-In-Place Concrete”
3. Section 05 1200 - “Structural Steel”
4. Section 05 3100 - “Steel Deck”
5. Section 05 4500 – “Light Gauge Steel Trusses”

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.

B. Construction Documents: Written, 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.

E. 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.

F. 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.

G. 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.

H. 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. 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.

B. Qualifications of Special Inspector: The Special Inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.

1. Duties and Responsibilities of the Special Inspector:

a. The Special Inspector shall observe the work assigned to ascertain, to the best of his/her knowledge that it is in conformance with the approved design drawings and specifications.

b. The Special Inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the Owner. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and Owner. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the Owner.

c. The Special Inspector shall create and maintain a log of all discrepancies throughout the duration of the project. This log shall include, but is not limited to, discrepancy date, description, drawing and/or detail reference, description of as-built condition, description of any remedial work performed, and status of discrepancy. This log shall be submitted to the Architect/Engineer on a periodic basis for the review and comment. Upon completion of the project, this log shall be submitted in its entirety as an attachment to the final signed report described below.

d. The Special Inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.

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.

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. Final Report of Special Inspections. Submitted by each agent listed in the schedule of Structural Testing and Special Inspections.

1.7 PAYMENT OF TESTING LABORATORY

A. The Owner will pay for the initial laboratory services for the testing of materials for compliance with the requirements of the contract documents. The Contractor will be liable to the Owner for the cost for testing and retesting of materials that do not comply with the requirements of the contract documents and shall furnish and pay for the testing and inspection of other items as specified in these Specifications.

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.

1. Contractor shall engage an engineer / architect to prepare repair and / or replacement procedures.
2. 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.
3. 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:

1. 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.
2. Review of proposed repair and / or replacement procedures by the registered design professional in responsible charge and the inspectors and testing agencies.
3. 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.

B. 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.

3.4 SCHEDULES AND FORMS – ATTACHED OR IN CONSTRUCTION DOCUMENTS

A. STATEMENT OF SPECIAL INSPECTIONS

B. SCHEDULE OF SPECIAL INSPECTIONS (ON STRUCTURAL DRAWINGS)

C. FINAL REPORT OF SPECIAL INSPECTIONS

END OF STRUCTURAL TESTS AND SPECIAL INSPECTIONS

STATEMENT OF SPECIAL INSPECTIONS

Project:
Project Address:
Permit Applicant:
Applicant Address:
Owner:
Owner Address:

Registered Design Professionals (RDP):

Architect:
Geotechnical Engineer:
Structural Engineer:
Mechanical Engineer:
Electrical Engineer:

This statement of special inspections is submitted as a condition for permit issuance in accordance with Chapter 17 of the International Building Code. It includes a *Schedule of Special Inspections* applicable to the above referenced project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections.

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the building official and to the registered design professional in responsible charge at a frequency agreed upon by the permit applicant and building official prior to the start of work. 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 the registered design professional in responsible charge prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted by each agent at the completion of that phase of work.

Maximum frequency of interim report submittals shall not be less than_____.

The Special Inspection program does not relieve the contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Owner's Acknowledgement:

_____
Signature Date

Building Official's Acceptance:

_____
Signature Date

_____
Permit No.

FINAL REPORT OF SPECIAL INSPECTIONS

Project:
Project Address:
Testing / Inspection Agent:
Testing / Inspection Agent Address:
Scope of Testing / Inspections:

(To be completed by Testing / Inspection Agent)

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 *Schedule of Special Inspections* submitted for permit, have been completed in accordance with the contract documents.

Interim reports submitted prior to this final report and numbered _____ to _____ form a basis for, and are to be considered an integral part of this final report. The following discrepancies that were outstanding since the last interim report dated have been corrected:

_____

_____

(Attach 8 1/2" x 11" continuation sheet(s) if required to complete the description of corrections)

Prepared By:

_____
Type or print name

_____
Signature Date

Special Inspector's Seal

(Licensed Professional Engineer)

SECTION 01 4223
REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 DEFINITIONS:

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated: The term “indicated” refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as “shown,” “noted,” “scheduled,” and “specified” are used, it is to help the reader locate the reference; no limitation on location is intended.

C. Directed: Terms such as “directed,” “requested,” “authorized,” “selected,” “approved,” “required,” and “permitted” mean “directed by the Architect,” “requested by the Architect,” and similar phrases.

D. Approve: The term “approved,” where used in conjunction with the Architect’s action on the Contractor’s submittals, applications, and requests, is limited to the Architect’s duties and responsibilities as stated in the Conditions of the Contract.

E. Regulation: The term “Regulations” includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish: The term “furnish” is used to mean “supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.”

G. Install: The term “install” is used to describe operations at project site including the actual “unloading, temporary storage, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

H. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

I. Installer:
   1. An “Installer” is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
   2. The term “experienced,” when used with the term “Installer,” means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

J. Trades: Use of titles such as “carpentry” is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter.” It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

K. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land on which the Project is to be built.
   1. If areas available are not indicated, they will be as mutually agreed by Owner and Contractor at Preconstruction Conference and as modified during construction.

L. Testing Laboratories: A “testing laboratory” is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

M. OFCI - Owner Furnished, Contractor Installed.

N. OFOI: Owner Furnished, Owner Installed.
   1. Equipment indicated on the drawings with the (OFOI) symbol designates the Owner will supply and deliver to the project site any equipment and finish items specified in these specifications and the Owner install the equipment and finish items in place ready for intended use.
   2. The Owner shall furnish all standard integral parts of the equipment and finishes, and tailgate-deliver items to project site.
   3. Owner shall receive items at site and give written receipt for items at time of delivery, noting visible defects or omissions. If such declaration is not given, the Owner shall assume responsibility for such defects and omissions. Contractor shall be responsible for cooperating with the Owner who shall provide unloading, handling and proper storage of equipment prior to installation at the site. The Owner and the Contractor will coordinate deliveries of equipment and finish items to coincide with construction schedule to minimize storage of equipment before installation.
   4. Owner shall uncrate, assemble, set items in place, and install items in accordance with manufacturer's instructions.
   5. Contractor shall provide utility rough-in for equipment items where required regardless of equipment responsibility designation unless specifically noted otherwise.
   6. Contractor shall be responsible for verification of utility requirements for approved equipment items. Upon request, the Owner shall make available dimensions and power characteristics of the Owner-furnished items.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION:

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute’s 50-Division format and MASTERFORMAT numbering system.

B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
   1. Abbreviated Language:
      a. Language used in Specifications and other Contract Documents is the abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.
   2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

1.04 INDUSTRY STANDARDS:

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standard in effect as of the date of the Contract Documents.

C. Conflicting Requirements:
   1. Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different, but apparently equal, and uncertainties to the Architect for a decision before proceeding.
   2. 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. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

D. Copies of Standards:
   1. Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
   2. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

1.05 DRAWING SYMBOLS:

A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., seventh edition.

B. Mechanical/Electrical Drawings: Graphic symbols used on mechanical and electrical drawings are generally aligned with symbols recommended by ASHRAE. Where appropriate, these symbols are supplemented by more specific symbols as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to the Architect/Engineer for clarification before proceeding.

1.06 SUBMITTALS:

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01 4533
CODE REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Document 00 3100 - Available Project Information: Soil investigation data.

B. Section 00 5000.02 - ACCS Form 2-B - General Conditions of the Construction Contract: Inspections and approvals required by public authorities.

C. Section 01 3000 - Administrative Requirements: Submittal procedures.

D. Section 01 4000 - QUALITY REQUIREMENTS.

E. Section 01 4223 - Reference Standards and Definitions.

F. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.

B. IAS: International Accreditation Service, Inc.

C. NIST: National Institute of Standards and Technology.

1.04 DEFINITIONS

A. Code or Building Code: ICC (IBC), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction (State of Alabama AND Local Municapility AHJ), Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.05 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete; 2019 (Reapproved 2022).

B. AISC 341 - Seismic Provisions for Structural Steel Buildings; 2022.

C. AISC 360 - Specification for Structural Steel Buildings; 2022.

D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

F. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2022a.

G. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2023.

H. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2017.

I. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.

J. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.

K. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2026.

L. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2019 (Reapproved 2023).

M. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019 (Reapproved 2023).

N. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.

O. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.

P. ASTM E2570/E2570M - Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage; 2007 (Reapproved 2025).

Q. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

R. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

S. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

T. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.

U. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291; 2019.

V. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

W. SJI 100 - Standard Specifications for K-Series, LH-Series, and DLH-Series Open Web Steel Joists, and for Joist Girders; 2020.

X. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.

2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Testing Agency is acceptable to AHJ.

D. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.

E. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.

F. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
1. Include:
a. Date issued.
b. Project title and number.
c. Name of Special Inspector.
d. Date and time of special inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of special inspection.
h. Date of special inspection.
i. Results of special inspection.
j. Compliance with Contract Documents.
2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

G. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
1. Include:
a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test or inspection.
h. Date of test or inspection.
i. Results of test or inspection.
j. Compliance with Contract Documents.

H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.

1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.07 SPECIAL INSPECTION AGENCY

A. Owner or Architect will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 TESTING AND INSPECTION AGENCIES

A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.09 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC291.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC89.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Division 03, 04 and 05: Special Inspections shall be per the Schedule of Inspection Services as indicated on Sheet S1.02 on the Structural Construction Documents.

B. Division 02, 31, 32 and 32: Special Inspections shall be per the referenced Specification Sections, Civil Construction Documents, and the Geotechnical Report.

C. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:

1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified reference standards.
3. Ascertain compliance of materials and products with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.04 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:

a. To provide access to work to be tested or inspected.
b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
c. To facilitate tests or inspections.
d. To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

3.05 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Field offices.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

B. Existing facilities may not be used.

C. New permanent facilities may be used.

D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:
   1. Telephone Lines: One line, minimum; one handset per line.
   2. Internet Connections: Minimum of one; DSL modem or faster.
   3. Cellular phones are an acceptable substitute for items 1 & 2, provided they fulfill requirements of same.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

E. Existing barriers on site shall be maintained by the Contractor throughout construction and relocated to Calhoun Community College's Tanner, AL Campus either upon completion of the project and / or when barriers become an impediment for construction progress to continue.

1.07 FENCING

A. Provide minimum 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks. Provide gates as required by Contractor and/or authorities having jurisdiction, with all related safety and warning signs.
   1. Fencing shall be at least 11-1/2 gauge galvanized chain-link fencing, securely held in place by posts, braces, rails, etc.

B. Fence shall be approximately 30-feet from perimeter of buildings, unless Drawings indicate otherwise. Extent of fencing shall be as required to maintain a secure worksite.

C. All such fencing shall be removed upon completion of the work of this project, removed from the site, and any post holes filled and compacted same as adjacent grade or paving, by the Contractor.

D. Responsibility and maintenance of such fencing and areas within such fencing shall be held by this Contractor beginning at the date of its erection and until its removal, close to the date of project completion.

E. Fencing should be located such that egress from adjacent buildings is not blocked. The Contractor may also be responsible for on-site coordination to allow for maintenance and deliveries of adjacent properties as requested by the Owner.

1.08 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.09 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.10 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Designated existing on-site roads may be used for construction traffic.

F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

G. See Section 01 1000 - Summery for additional information regarding parking areas.

1.11 WASTE REMOVAL

A. See Section 01 7419 - CONSTRUCTION WASTE MANAGEMENT and DISPOSAL, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT SIGNS

A. See Section 01 0150 - "SPECIAL CONDITIONS" for requirements.

1.13 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 10 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Procedures for Owner-supplied products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Instructions To Bidders, and Supplementary Instructions To Bidders: Additional information and requirements concerning Substitutions.

B. Section 01 4000 - QUALITY REQUIREMENTS: Product quality monitoring.

1.03 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 - PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made of wood from newly cut old growth timber.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. Are extracted, harvested, and/or manufactured closer to the location of the project.
   2. Have longer documented life span under normal use.
   3. Result in less construction waste. See Section 01 7419 - Construction Waste Management and Disposal.
   4. Are made of vegetable materials that are rapidly renewable.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. Acceptance of suppliers, manufacturers, and/or products shall be limited to those named, unless others are properly submitted during bidding in accordance with substitution procedures, and subsequently accepted.

B. Instructions to Bidders specifies time restrictions and procedures for submitting requests for substitutions during the bidding period. These time restrictions and procedures are superceded by any modifications found in Supplementary Instructions to Bidders (or Additions to Instructions to Bidders).

C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
   1. Submittals during construction other than those pre-qualified or pre-accepted will not be reviewed, but instead returned for re-submittal, without exception.

D. Substitution Submittal Procedure. A proper pre-bid submittal for "pre-qualified" or "pre-accepted" consideration and review, shall be one which includes at least the following:
   1. Submit any request for substitution for consideration. Limit each request to one proposed substitution.
      a. Use Substitution Request form attached at end of this Section.
   2. Submit with cover letter which outlines the purpose of the submittal, Architect's specifications which apply, and each variation from the original specification.
   3. Submit product data (all current and relevant manufacturer's published data), certified test results attesting to the proposed product equivalence, and additional information as required so that a review can be quickly made by comparing the submittal item for item to the original specification. Include samples and other data as requested for the original item. Burden of proof is on proposer.
   4. Substitution requests shall be submitted through a qualified General Contractor bidding the project.

E. After receipt of bids and execution of the Construction Contract, the Owner and the Architect will consider substitutions only under the following conditions:
   1. Unavailability of materials if beyond the control of the Contractor and submitted proof that firm orders for the material were placed within ten (10) days after approval of the Subcontractors and Material Suppliers Lists.
   2. Other unavailability will be considered only as being due to strikes, lockouts, bankruptcy, or discontinuance of manufacture.
   3. Any approved substitutions shall be incorporated into the Contract by Change Order.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419 - Construction Waste Management and Disposal.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Cutting and patching.

D. Cleaning and protection.

E. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

F. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 01 4000 - QUALITY REQUIREMENTS: Testing and inspection procedures.

C. Section 01 5000 - TEMPORARY FACILITIES and CONTROLS: Temporary exterior enclosures.

D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

E. Section 02 4100 - Selective Demolition: Selective demolition of building elements for alterations purposes.

F. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.

c. Necessity for cutting or alteration.
d. Description of proposed work and products to be used.
e. Alternatives to cutting and patching.
f. Effect on work of Owner or separate Contractor.
g. Written permission of affected separate Contractor.
h. Date and time work will be executed.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water.

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
1. Minimize amount of bare soil exposed at one time.
2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
1. Contractor shall schedule ordering of products, taking lead-times into account, and shall be responsible for any cost associated with expediting delivery of specified items in order to keep project on schedule.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and

conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner-occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
   1. Every trade shall examine substrate to determine if it is adequate to receive the work of that section prior to initiating work.
   2. Notify Contractor of any deficiencies needing correction.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

I. Patching:
   1. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
   2. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   3. Match color, texture, and appearance.

4. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.09 FINAL CLEANING

A. Execute final cleaning prior to Substantial Completion.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Replace filters of operating equipment.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.10 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to Architect.

B. The Contractor shall generate and provide a punch-list to the Architect prior to requesting inspection for substantial completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Accompany Architect on Contractor's preliminary final inspection.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.11 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

E. The following sources may be useful in developing the Waste Management Plan:

F. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. Section 01 5000 - TEMPORARY FACILITIES and CONTROLS: Additional requirements related to trash/waste collection and removal facilities and services.

D. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

E. Section 01 7000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
   4. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. See Section 01 6000 - Product Requirements for substitution submission procedures.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 6000 - Product Requirements.
   1. Relative amount of waste produced, compared to specified product.
   2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
   3. Proposed disposal method for waste product.
   4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 - Administrative Requirements for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 - Temporary Facilities and Controls for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 - Product Requirements for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 - Execution and Closeout Requirements for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.
   4. Job safety meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. As a minimum, provide:
      a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
      b. Separate dumpsters for each category of recyclable.
      c. Recycling bins at worker lunch area.
   2. Provide containers as required.
   3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
   4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
   5. Locate enclosures out of the way of construction traffic.
   6. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
   8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified

materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment. All record documents, warranties and O&M manuals are to be submitted in paper format (1 copy) along with 1 copy of PDFs of the documents.

B. At completion of Project, the Contractor shall submit to Architect a complete set of clearly marked-up Project Documents, as follows:
   1. One (1) Original Set clearly marked as-built, record drawings and specifications.
   2. One(1) copy of PDFs: Each with as-built record drawings and as-built record specifications along with O&M Manuals and Warranties.

C. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit one paper set and one PDF set of revised final documents in final form within 10 days after final inspection, each with as-built record drawings and as-built record specifications along with O&M Manuals and Warranties as referenced above.

D. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
   4. Submit PDFs of as-built record drawings and as-built record specifications along with O&M Manuals and Warranties as referenced above.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawingsand Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

G. Scan marked-up Record Drawings and Specifications onto one(1) CD, DVD, or other portable digital media storage device (each with as-built record drawings and as-built record specifications).

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

O. Include test and balancing reports.

P. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.

N. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

O. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

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SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. Electrical systems and equipment.
   3. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Finishes, including flooring, wall finishes, ceiling finishes.
   2. Fixtures and fittings.
   3. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including Supplementary Conditions and Division 01 Specification sections, apply to the work of this Section.

B. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

C. Section 01 9113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

D. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Architect for transmittal to Owner.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Reports:
   1. Identification of each training session, date, time, and duration.
   2. Sign-in sheet showing names and job titles of attendees.
   3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.

D. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.

1. Format: USB Drive.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstration may be combined with Owner personnel training if applicable.

C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. Owner will provide classroom and seating at no cost to Contractor.

C. Provide training in minimum two hour segments.

D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

F. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.

5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

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SECTION 02 4100

DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Abandonment and removal of existing utilities and utility structures.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

E. Section 01 7000 – Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

F. Section 31 1000 - Site Clearing: Vegetation and existing debris removal.

G. Section 31 2000 – Earth Moving: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.3 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:

1. Areas for temporary construction and field offices.

2. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.

1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.

2. Identify demolition firm and submit qualifications.

3. Include a summary of safety procedures.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications:

1. Company specializing in the type of work required.

B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1. Where required by local Health Department or other authorities having jurisdiction, provide certificate of pest and rodent eradication and subsequent inspection completed prior to and after building demolition.

C. Pre-demolition Conference: Demolition will be reviewed at required Preconstruction Conference for the Project.

1. In addition, conduct pre-demolition conferences at Project site with Owner's representatives, to provide final notice to and coordination with Owner's representatives and on-site personnel.

D. Notices: Contractor shall provide all notices required by Code, applicable regulations, ordinances and/or local and other authorities having jurisdiction.

1. All notices shall be in writing, with copies provided to the Owner and Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill Material: As specified in Section 31 2000 – Earth Moving.

PART 3 – EXECUTION

3.1 SCOPE

A. Extent of demolition is indicated on the Plan.

B. Remove paving and curbs as required to accomplish new work.

C. Remove items indicated

D. Remove other items indicated, for salvage, relocation, and recycling.

E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2000.

F. Salvage, relocate, or recycle as directed and as applicable.

a. The Owner reserves the right of first refusal for any structures, materials, and/or accessory items on site or within the buildings including, but not limited to, fire alarm panels and accessories, door hardware, electrical transformers, copper tubing, onsite trees and shrubs, and other items of value that may or may not be shown on the plans or called out in the project manual. Any items removed from the site without prior approval from the Owner will be paid to the Owner by the contractor at two times (2x) the market value.

G. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.

2. Comply with applicable requirements of NFPA 241.

3. Use of explosives is not permitted.

4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.

5. Provide, erect, and maintain temporary barriers and security devices.

6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

8. Do not close or obstruct roadways or sidewalks without permit.

9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of Notification To Proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed and delivered to a location as directed by the Owner.

D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

E. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.

2. Prevent movement or settlement of adjacent structures.

3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

1. Removal of asbestos shall be subject to state and local regulatory requirements.

H. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Dismantle existing construction and separate materials.

2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

I. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies.

1. The locations of existing underground utilities are shown in an approximate manner only. The Contractor shall determine exact location of all existing utilities before commencing work. The contractor shall be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities. The Contractor shall contact Alabama One Call (811) a minimum of 48 hours prior to excavation. If no paint is visible, Contractor shall not perform excavation until verifying with that work site is cleared for excavation.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 5 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as shown.

2. Report discrepancies to Engineer or Engineers before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.

1. Remove items indicated on drawings.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.

2. Where existing active systems serve occupied facilities, but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

3. Verify that abandoned services serve only abandoned facilities before removal.

4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.

3. Repair adjacent construction and finishes damaged during removal work.

4. Patch as specified for patching new work.

3.5 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash and legally dispose of off-site.

B. Remove from site all materials not to be reused on site; do not burn or bury.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF DEMOLITION

SECTION 02 8200
ASBESTOS ABATEMENT

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. 29 CFR 1926.1101 - Asbestos; Current Edition.

B. 40 CFR Part 61 (NESHAP)

C. ADEM Asbestos Rules and Notifications

D. DOT 49 CFR Parts 171-173 for Transport

1.02 SUMMARY

A. This specification outlines the requirements for the safe removal and disposal of asbestos-containing materials (ACM) and other regulated materials on small-scale abatement projects in Alabama. It is intended for use prior to demolition or renovation activities and ensures compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) under Environmental Protection Agency (EPA) 40 CFR Part 61, Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1101, Alabama Department of Environmental Management (ADEM) regulations, and applicable Department of Transportation (DOT) transport rules. Project-specific details shall be provided below as applicable.

Project Name: Reid State Technical College Maritime Industrial Base (MIB) Workforce Renovation, Building 300

Project Location: Evergreen, Conecuh County, Alabama

Owner: Reid State Technical College

Owner's Representative: Goodwyn Mills Cawood

Abatement Designer: Pierce Lagle

Asbestos Inspector: Pierce Lagle

B. Qualified Professional (QP): The Owner shall designate and retain a QP, defined as an individual who has successfully completed training and is accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector. The QP must be qualified to perform visual inspections as indicated in American Society for Testing and Materials (ASTM) E 1368 and shall be appropriately licensed in the State of Alabama as an Asbestos Inspector.

The Owner or Contractor shall elect a firm to act as the Project Monitor, with the QP serving in this role and being responsible for pre-abatement inspections, project monitoring, any additional sampling, implementation of procedural recommendations, scope interpretations, and final visual inspections confirming no visible asbestos emissions or residue per 40 CFR Part 61, Subpart M (NESHAP). The QP shall remain independent of the abatement contractor and ensure compliance with all NESHAP work practices, notification, and waste disposal requirements prior to project closeout.

C. The asbestos survey conducted by Goodwyn Mills Cawood dated January 23, 2026, identified ACM requiring abatement, as summarized in section 1.05. The purpose of this abatement is to remove and properly dispose of all friable and non-friable ACM in a controlled manner to protect workers, building occupants, adjacent properties, and the environment prior to demolition activities. The Contractor shall verify all quantities and conditions by site visit prior to bidding.

1.03 PERFORMANCE REQUIREMENTS

A. The Contractor shall furnish all labor, supervision, materials, equipment, tools, worker training, transportation, protective clothing, respiratory protection, and disposal services necessary for the complete abatement. All costs associated with permits, licenses, notifications, hauling, and disposal are the Contractor's responsibility. Work shall strictly adhere to this specification and all

applicable federal, state, and local regulations, including but not limited to EPA NESHAP, OSHA asbestos standards, ADEM asbestos program requirements, and DOT hazardous materials transport regulations.

B. The Contractor must hold current Alabama asbestos abatement licenses for supervisors and workers, as well as any required General Contractor's license. All personnel shall be trained and accredited through an EPA-approved program and certified by the State of Alabama. A competent, Alabama-licensed Superintendent shall be on site at all times with full authority to act on behalf of the Contractor. The Superintendent shall manage all communications with the Owner and ensure compliance with site safety rules.

1.04 SUBMITTALS

A. Prior to Start:
   1. Obtain all necessary permits and provide notifications at their expense within 10 days of Notice to Proceed, including ADEM asbestos project notification, Jefferson County Department of Health (or local equivalent) air pollution notice, and any local requirements. Copies of all permits, notifications, licenses, training certificates, and waste disposal agreements shall be submitted to the Owner prior to mobilization.

B. Post-Completion (Within 2 Weeks):
   1. Approved submittals; notifications and permits; daily logs signed by the general contractor; waste manifests; disposal tickets; and final survey photos (if required). The Owner reserves the right to withhold final payment until all documents are received.

1.05 SCOPE OF WORK

A. Idenfied ACM:
   1. Beige interior window caulking: associated with windows on the office in the lab area. Approximately two window areas were identified during the inspection report.
   2. Gray doorway caulking: assocaited with the exit doorways in the building. Approximately five (5) doors were identified to contain ACM caulking.

B. Assumed ACM:
   1. Fire Doors: Presumably five (5) fire doors were observed within the subject building. Older fire doors lacking clear material documentation are assumed to contain asbestos in cores, glazing, or gaskets/seals due to their historical use for fire resistance. These assumed materials appeared intact and non-friable, with no visible deterioration. Demolition activities, such as cutting or removal, could release asbestos fibers if present.
   2. Any material that is suspected to be asbestos-containing but was not sampled during the initial survey shall be assumed positive for asbestos and treated as ACM for the purposes of this abatement project, unless subsequent laboratory analysis confirms the material as negative for asbestos.

   Quantities provided in this specification are estimates and shall be verified by the contractor prior to submitting bid.

C. Other Regulated Materials:
   1. During asbestos abatement work, removal of ceilings and select walls may be required. The contractor shall be responsible for removal of and disposal of the following items:
      a. Light Fixtures within demolition work areas. These light fixtures may contain regulated materials. Specifically:
         1) Fluorescent light fixture ballasts are known to contain oil with polychlorinated biphenyls (PCBs). Light fixtures demolished during the work shall be checked for the presence of PCB ballasts. All ballasts that are not clearly labeled "No-PCBs" shall be considered to contain PCBs and handled appropriately.
         2) Fluorescent light bulbs may contain mercury and mercury vapors. Bulbs are to be collected without breakage for disposal.

b. Mercury controller switches such as those associated with HVAC equipment, may be encountered and shall be handled appropriately without breakage by recycling.
c. Refrigerants shall be reclaimed by a licensed technician, if applicable.
d. Electronics including keyboards, monitors, AV equipment, communications equipment, control panels, servers, routers, hubs, printers, batteries, etc., shall be collected and sent to a recycler for proper dismantling, sorting, and diversion of raw materials.
e. Chemicals and compressed gases should be returned to the manufacturer/distributor for proper disposal.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wetting Agents: Amended water or EPA-approved removal encapsulant sufficient to keep ACM wet throughout removal.

B. Sheeting: 6-mil polyethylene sheeting, fire-retardant type.

C. Disposal Bags/Containers: 6-mil thick, labeled per OSHA/EPA/DOT.

D. Personal Protective Equipment (PPE): National Institute for Occupational Safety and Health (NIOSH)-approved respirators, Tyvek coveralls, gloves, booties.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions and ACM quantities prior to starting work. Any quantities provided in this specification or any other document are to be considered estimates and shall not be used as the sole basis of quantities for bidding purposes.

3.02 PREPARATION

A. General Work Requirements:
1. Operations shall be confined to designated areas approved by the Owner. A staging area for equipment mobilization, load-out, and demobilization will be provided; all other areas are off-limits.
2. The Contractor shall coordinate utility cutoffs or temporary services with the Owner, using qualified tradesmen, (as needed).

B. Work Area Preparation: Prior to abatement, establish a regulated work area with continuous visual barriers (e.g., 6-mil poly sheeting) and warning signs stating:

DANGER

CONTAINS ASBESTOS FIBERS

MAY CAUSE CANCER

CAUSES DAMAGE TO LUNGS

DO NOT BREATHE DUST

AVOID CREATING DUST

C. Restrict access to essential personnel. Cover all floor/ground surfaces under and around the work area with two layers of 6-mil polyethylene sheeting, extending 6 feet beyond the perimeter where practicable. Seal floor drains, sumps, and penetrations with plywood and poly; collect and filter all wastewater through a High-Efficiency Particulate Air (HEPA) filtration system prior to sanitary sewer discharge. Isolate non-work areas with airtight temporary partitions.

3.03 WORKER PROTECTION AND DECONTAMINATION

A. The Contractor is solely responsible for worker safety, providing adequate guards, PPE, and training per OSHA standards. All workers shall wear NIOSH-approved half- or full-face respirators suitable for asbestos (e.g., Powered Air-Purifying Respirator (PAPRs) for higher exposures),

disposable Tyvek coveralls, gloves, and booties. Respirators shall be fit-tested and inspected daily.

B. Establish a worker decontamination area at the regulated area entrance/exit. Workers and visitors shall pass through decon: remove gross contamination, HEPA vacuum clothing, then dispose of coveralls in labeled impermeable bags. Provide showers, changing areas, and laundry as needed. No contaminated clothing or equipment shall leave the site without proper decontamination.

3.04 ABATEMENT PROCEDURES

A. ACM shall be thoroughly wetted with amended water or removal encapsulant prior to disturbance and kept wet throughout removal, packaging, and until sealed for transport. Remove materials intact where possible by cutting fasteners and carefully lowering panels or sections one at a time to minimize fiber release. Use hand tools only; prohibit high-speed power tools unless equipped with HEPA local exhaust.

B. Place removed ACM immediately into labeled 6-mil disposal bags or double-wrapped in 6-mil poly sheeting. Ensure no visible residue remains. At end of each shift, perform thorough cleanup: wet wipe surfaces, HEPA vacuum all areas, and remove all debris to secure, covered containers. No loose ACM, dust, or debris shall remain overnight.

3.05 AIR MONITORING AND QUALITY CONTROL

A. The Contractor shall be responsible for performing air monitoring as outlined below:
   1. Personnel air monitoring in accordance with OSHA 29 CFR Part 1926.1101
   2. Adjacent area air monitoring or air monitoring conducted outside the structure during asbestos removal, as applicable. The air monitoring and analysis shall be performed by an Air Monitoring Specialist / firm contracted by the Contractor. The air samples shall be analyzed by Phase Contrast Microscopy (PCM), NIOSH Method 7400. Air results shall be made available to the Owner, General Contractor, and Owner's Representative within 24-hours.

3.06 WASTE HANDLING AND DISPOSAL

A. All ACM debris is regulated ACM (RACM). Package wet RACM in double 6-mil bags or two layers of sheeting, sealed airtight and labeled per OSHA, EPA, and DOT:

ASBESTOS WASTE

DO NOT REUSE

B. Transport sealed containers directly to an ADEM-approved Subtitle D landfill accepting asbestos waste. Comply with 40 CFR Part 61, 49 CFR Parts 171-173, and state hauling rules. Submit waste manifests to Owner prior to shipment; retain signed copies for records.

3.07 FINAL INSPECTIONS AND TESTING

A. After cleaning and decontamination of the workspace has been conducted, and if a high degree of cleanliness has been achieved, notify the QP that the workspace is ready for inspection. The QP will visually inspect each Work Area where abatement activity was conducted to determine whether the cleanup has been properly completed and to detect any visible asbestos dust or contamination. The visual inspection will be conducted in general compliance with ASTM E1368, Standard Practice for Visual Inspection of Asbestos Abatement Projects.

For non-friable materials or areas requiring only visual clearance: If the QP's visual inspection confirms no visible residue, dust, or contamination, the Work Area achieves final clearance. No air clearance testing (PCM/Transmission Electron Microscopy (TEM)) is required for these materials/areas.

If visible contamination is detected during the QP inspection, the Abatement Contractor will be responsible for re-cleaning the area at no additional cost or schedule impact to Owner. Additional QP visual inspections will be performed following re-cleaning until acceptable cleanliness is achieved. The Abatement Contractor will be responsible for fees and expenses related to re-inspections after re-cleaning.

END OF SECTION

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04/30/2026

FOR SPECIFICATION SECTIONS
01 4100, 03 3100, 05 1200, 05 2100, AND 05 3100

SECTION 03 3100

CONCRETE

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Formwork.
2. Reinforcing.
3. Cast-in place concrete including mix design, placement procedures, and finishes.

B. Cast-in-place concrete includes the following:

1. Foundations and footings.
2. Slabs-on-grade.
3. Equipment pads and bases.

C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 02 2000, "Earthwork": Drainage fill under slabs on grade.
2. Section 02 5140, "Portland Cement Concrete Paving": Concrete paving and walks.
3. Section 03 3500, “Concrete Toppings”
4. Section 03 4100, “Structural Precast Concrete”
5. Section 04 2000, "Unit Masonry": Concrete fill for masonry lintels.
6. Section 05 5000, "Metal Fabrications": Metal items to be built into concrete.
7. Section 07 9000, "Sealants and Joint Fillers": Sealants and joint fillers in concrete work.
8. Section 09 6260, “Resilient Athletic Flooring”
9. Respective Sections of Division 15 and 16, as applicable, for furnishing of inserts, anchorage and erection items required for mechanical and electrical work..
10. Divisions 15 and 16, as applicable, for furnishing and setting of conduit, pipes and sleeves for mechanical and electrical equipment.

1.2 SUBMITTALS:

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

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 if requested by Architect.

C. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and

arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:

1. Color finishes.
2. Normal weight aggregates.
3. Reglets.
4. Waterstops.
5. Vapor retarder/barrier.

E. Laboratory test reports for concrete materials and mix design test.

F. Minutes of pre-installation conference.

1.3 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the 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: Engage a testing agency 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.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings" and the following:

1. At least 35 days prior to submitting design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:

a. Contractor's superintendent.
b. Agency responsible for concrete design mixes.
c. Agency responsible for field quality control.
d. Ready-mix concrete producer.
e. Concrete subcontractor.
f. Primary admixture manufacturers.

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.

2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Form Liner: Pattern 16020 Rough Sawn Plank, Rough Grain Plank, horizontal orientation by Fitzgerald Formliners, or equal – Concrete walls at monumental stair. Coordinate location with architectural drawings.

D. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) 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 of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

F. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the 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 Fabric: ASTM A 185, welded steel wire fabric.

D. Deformed-Steel Welded Wire Fabric: ASTM A 497.

E. 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 protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

F. 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.

G. Mechanical Splices: Equal to "Cadweld Rebar Splices", as manufactured by Erico Products, Inc., "C" Series, for developing 125% of minimum ASTM specified yield strengths, unless otherwise noted on drawings.

H. Steel Shapes, Plates and Rods: Conform to ASTM A 36, "Specification for Structural Steel".

I. 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 F or C.

1. Limit use of fly ash to not exceed 20 percent of cement content by weight.

C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

D. Water: Potable.

E. Admixtures, General: Provide concrete admixtures 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.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Air-Tite, Cormix Construction Chemicals.
   b. Air-Mix or Perma-Air, Euclid Chemical Co.
   c. Darex AEA or Daravair, W.R. Grace & Co.
   d. MB-VR or Micro-Air, Master Builders, Inc.
   e. Sealtight AEA, W.R. Meadows, Inc.
   f. Sika AER, Sika Corp.

G. Water-Reducing Admixture: ASTM C 494, Type A.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. PSI N, Cormix Construction Chemicals.
   b. Eucon WR-75, Euclid Chemical Co.
   c. WRDA, W.R. Grace & Co.
   d. Pozzolith Normal or Polyheed, Master Builders, Inc.
   e. Plastocrete 161, Sika Corp.

H. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Eucon 37, Euclid Chemical Co.
   b. WRDA 19 or Daracem, W.R. Grace & Co.
   c. Rheobuild or Polyheed, Master Builders, Inc.
   d. Sikament 300, Sika Corp.

I. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Accelguard 80, Euclid Chemical Co.
   b. Daraset, W.R. Grace & Co.
   c. Pozzutec 20, Master Builders, Inc.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Eucon Retarder 75, Euclid Chemical Co.
   b. Daratard-17, W.R. Grace & Co.
   c. Pozzolith R, Master Builders, Inc.
   d. Protard, Prokrete Industries.
   e. Plastiment, Sika Corporation.

2.4 RELATED MATERIALS:

A. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

B. Vapor Barrier:

1. Vapor Barrier, General Use (except as indicated below):

    a. Product: Plastic vapor barrier. Include manufacturer's recommended adhesive or pressure-sensitive tape for sealing joints, laps and penetrations, preformed boots for penetrations, and all other components required for a complete, proper and vaporproof installation in accordance with ASTM E1643.
        1) Classification: Must exceed ASTM E 1745 Class "A".
        2) Permeance: ASTM E96: 0.02 perms or less.
        3) Thickness: Not less than 15 mils.

    b. Manufacturer/Product:
        1) "Moistop Ultra 15 mil", Fortifiber Building Systems Group.
        2) "Perminator 15 mil", W.R. Meadows
        3) "Griffolyn Type-105", Reef Industries, Inc.
        4) "Stego Wrap 15 mil", Stego Industries, LLC.
        5) "VaporBlock VB15", Raven Inc.
        6) "Husky Yellow Guard 15 mil", Poly-America, L.P.

    c. "Locations for Use: Continuous below all new and opened building slabs, and other structural slabs, porches, stoops, pads, covered (below roofs) areas, etc., on grade, and turned-down to tops of footings.

2. Vapor Barrier, **Below Wood Flooring**: Provide below and 5'-0" beyond all wood flooring; Premolded seven-ply membrane consisting of reinforced core and carrier sheet with fortified bitumen layers, protective weathercoating, and plastic anti-stick sheet. Provide manufacturer's recommended mastics and gusset tape.

    a. Product/Manufacturer: Subject to compliance with requirements, provide "Premoulded Membrane Vapor Seal with Plasmatic Core," as manufactured by W.R. Meadows, Inc.; Austell, GA.
    b. Locations for Use: Continuous below and 5'-0" beyond all wood flooring.

C. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as the abrasive aggregate for a 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, nonglazing, and unaffected by freezing, moisture, and cleaning materials.

D. Colored Wear-Resistant Finish: Packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground nonfading mineral oxides interground with cement. Color as selected by Architect from manufacturers' standards, unless otherwise indicated.

1. Products: Subject to compliance with requirements, provide one of the following:
    a. Quartz Tuff, Dayton-Superior.
    b. Surflex, Euclid Chemical Co.
    c. Colorundum, A.C. Horn, Inc.
    d. Quartz Plate, L&M Construction Chemicals, Inc.
    e. Colorcron, Master Builders, Inc.
    f. Lithochrome Color Hardener, L.M. Scofield Co.
    g. Harcol Redi-Mix, Sonneborn-Chemrex.
    h. Hard Top, Symons Corp.

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 0.55 kg/sq. meter when applied at 200 sq. ft./gal.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Spartan-Cote, The Burke Co.
   b. Day-Chem Cure and Seal, Dayton Superior Corp.
   c. Eucocure, Euclid Chemical Co.
   d. Horn Clear Seal, A.C. Horn, Inc.
   e. L&M Cure R, L&M Construction Chemicals, Inc.
   f. Masterkure, Master Builders, Inc.
   g. CS-309, W.R. Meadows, Inc.
   h. Kure-N-Seal, Sonneborn-Chemrex.

H. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.

1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Sealco - VOC, Cormix Construction Chemicals.
   b. Safe Cure and Seal, Dayton Superior Corp.
   c. Aqua-Cure, Euclid Chemical Co.
   d. Dress & Seal WB, L&M Construction Chemicals, Inc.
   e. Masterkure 100W, Master Builders, Inc.
   f. Vocomp-20, W.R. Meadows, Inc.

I. V.O.C. Compliant Acrylic Curing and Sealing Type (30 Percent): Liquid type membrane-forming curing compound complying with ASTM C 309, Type 1, Class A and B. Provide 30 percent solids minimum, for surfaces indicated to be sealed.

J. Safe Cure and Seal: 30 percent (J-19), Dayton Superior Inc.

K. Evaporation Control:

1. Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1. Eucobar, Euclid Chemical Co.
      2. E-Con, L&M Construction Chemicals, Inc.
      3. Confilm, Master Builders, Inc.

L. V.O.C. Compliant Evaporation Control: Sure Film (J-74), Dayton Superior Inc.

M. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. K-15, Ardex, Inc.
   b. LevelLayer II, Dayton Superior Corp.
   c. Flo-Top, Euclid Chemical Co.
   d. Gyp-Crete, Gyp-Crete Corp.
   e. Levelex, L&M Construction Chemicals, Inc.
   f. Underlayment 110, Master Builders, Inc.
   g. Thoro Underlayment Self-Leveling, Thoro System Products.

N. Bonding Agent: Polyvinyl acetate or acrylic base.

1. Products: Subject to compliance with requirements, provide one of 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.
      5. Ready Bond, Symons Corp.
   b. Acrylic or Styrene Butadiene:
      1. Acrylic Bondcrete, The Burke Co.
      2. Day-Chem Ad Bond, Dayton Superior Corp.
      3. SBR Latex, Euclid Chemical Co.
      4. Daraweld C, W.R. Grace & Co.
      5. Hornweld, A.C. Horn, Inc.
      6. Everbond, L&M Construction Chemicals, Inc.
      7. Acryl-Set, Master Builders Inc.
      8. Intralok, W.R. Meadows, Inc.
      9. Sonocrete, Sonneborn-Chemrex.

O. 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. Products: Subject to compliance with requirements, provide one of the following:
   a. Resi-Bond (J-58), Dayton Superior.
   b. Euco Epoxy System #452 or #620, Euclid Chemical Co.
   c. Epoxtite Binder 2390, A.C. Horn, Inc.
   d. Epabond, L&M Construction Chemicals, Inc.
   e. Concresive Standard Liquid, Master Builders, Inc.
   f. Rezi-Weld 1000, W.R. Meadows, Inc.
   g. Sikadur 32 Hi-Mod, Sika Corp.

P. Interior Epoxy Sealer: Use a maximum 35 percent type.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Epoxy-Plus; Dayton Superior Inc.
   b. Eucopoxy 1; Euclid Chemical
   c. Oauerseal 30E; Non-Crete, Inc.
   d. Rescon R117; Symons Corp.
   e. Son-No-Mar; Sonneborn, Div./Chem Rex Inc.
   f. Super Seal 35; L & M Const. Chem. Co.

Q. V.O.C. Compliant Urethane Sealer:

1. Day Chem Urethane V.O.C. (J-39); Dayton Superior Inc.

2.5 PROPORTIONING AND DESIGNING 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 318-05 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 318-05 Section 5.3 are required for the following types of concrete:

1. Normal weight concrete with specified strength in excess of 4000 psi.
2. 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 318-05 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. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:

1. Subjected to freezing and thawing: W/C 0.45.
2. Subjected to deicers/watertight: W/C 0.40.

3. Subjected to brackish water, salt spray, or deicers: W/C 0.40.

G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps and sloping surfaces: Not more than 3 inches.
2. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
4. Other concrete: Not less than 3 inches and not more than 5 inches.

2.6 ADMIXTURES:

A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg.F (10 deg.C).

C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.

D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
   a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) for 1-1/2-inch maximum aggregate.
   b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) for 1-inch maximum aggregate.
   c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
   d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for 1/2-inch maximum aggregate.
2. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent air.

E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

1. 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.

PART 3 - EXECUTION

3.1 GENERAL:

A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS:

A. General: Design, erect, support, brace, and maintain formwork to support vertical, 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 and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

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 the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

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 for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing 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 placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION:

A. General: Place vapor retarder/barrier sheeting in position with longest dimension parallel with direction of pour.

B. Lap vapor barrier over footings and/or seal to foundation walls.

C. Lap joints 6 inches and seal with manufacturer's recommended mastic or pressure-sensitive tape.

D. Seal all penetrations (including pipes) per manufacturer’s instructions.

E. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

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 specified.

1. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

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 approved by Architect.

D. Place reinforcement to maintain minimum coverages as indicated 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 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.

3.5 JOINTS:

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.

B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.

C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across

construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

E. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Joint fillers and sealants are specified in Section 07900, "Sealants and Joint Fillers".

F. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.

1. Form contraction joints 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. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
3. If joint pattern is 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).
4. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS:

A. General: Set and build into formwork 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.

B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

C. Install dovetail anchor slots in concrete structures as indicated on drawings.

D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve 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 PREPARING FORM SURFACES:

A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

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 trades to permit installation of their work.

B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a 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 on chairs during concrete placement.

F. Cold-Weather Placement: 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.

G. 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, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to 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. Using 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 embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES:

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished 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-Formed Finish: Provide a smooth-formed finish on 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 another 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.

C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.

1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 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 where indicated.

1. After placing slabs, finish surface to tolerances specified in Section 3.11. 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 specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where 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, or 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. Finish surfaces to tolerances specified in Section 3.11. 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 a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another 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 finish surfaces to tolerances specified in Section 3.11. Grind smooth any 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 a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.

E. Nonslip Broom Finish: Apply a 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.

F. Colored Wear-Resistant Finish: Apply a colored wear-resistant finish to monolithic slab surface indicated.

1. Apply dry shake materials for the colored wear-resistant finish at a rate of 100 lb per 100 sq. ft., unless a 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 the first floating operation, uniformly distribute with mechanical spreader approximately two-thirds of the required weight of the dry shake material over

the concrete surface, and embed by 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 broadcasting and floating, apply a trowel finish as specified. Cure slab surface with a curing compound recommended by the dry shake material manufacturer. Apply the curing compound immediately after the final finishing.

3.11 FLOOR FLATNESS/LEVELNESS REQUIREMENTS:

A. After placing slabs, finish surface to the following tolerances of F(F) (floor flatness) and F(L) (floor levelness) measured according to ASTM E 1155:

FINISH	SLAB-ON-GRADE				FRAMED FLOOR	
	OVERALL		LOCAL		OVERALL	LOCAL
	FF	FL	FF	FL	FF	FF
Scratch Finish	18	15	15	13	25	22
Float Finish	20	17	18	15	25	22
Trowel Finish	25	22	20	17	25	22

Specified overall F-numbers apply to the whole floor, taken as one. Minimum local F-numbers apply to each slab, bounded by construction joints.

3.12 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 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 by 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 diagrams or templates of manufacturer furnishing machines and equipment.

3.13 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 according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. No curing agents or sealers are to be applied to the concrete slab where Resilient Athletic Flooring is scheduled.

C. 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.

D. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

1. Provide moisture curing by the following methods:

a. Keep concrete surface continuously wet by covering with water.
b. Use continuous water-fog spray.
c. 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 a 4-inch lap over adjacent absorptive covers.

2. Provide moisture-retaining cover curing as follows:
a. 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.

3. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
a. Apply curing 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 according to 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.
b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

E. 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 the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

F. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.14 REMOVING 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.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75

percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.15 REUSING FORMS:

A. Clean and repair surfaces of forms to be reused in the 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.

3.16 CONCRETE SURFACE REPAIRS:

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.

B. Mix dry-pack mortar, 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.

1. Cut out honeycombs, 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 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 bonding agent. Place patching mortar before bonding agent has dried.

2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and

smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, 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 completing surface finishing operations by cutting out low areas and replacing with patching mortar. 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, by cutting out and replacing with fresh concrete. Remove defective areas 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 agent. 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. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

F. Repair methods not specified above may be used, subject to acceptance of Architect.

3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. General: The Owner will employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
   a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
   b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
   c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg.F (4 deg.C) and below, when 80 deg.F (27 deg.C) and above, and one test for each set of compressive-strength specimens.
   d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

C. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in

any one day, or for each 5000 sq ft of surface are placed; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

1. Any additional cylinder required by the Contractor for early strength gain tests for form stripping or post-tensioning are Contractor's responsibility and shall be paid for by Contractor.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
6. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
7. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
8. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, 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.

END OF CONCRETE

SECTION 03 3660
SEALED CONCRETE FLOOR

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Floors denoted on Finish Schedule as SC (Sealed Concrete).
   2. Furnish all labor, materials, equipment and services necessary for grinding and sealing concrete floors.
   3. PROTECTION OF CONCRETE SLABS DURING CONSTRUCTION.

1.02 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General Conditions and Division 1 Specification Sections, apply to the work of this Section.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete materials, placing, and finishing.

C. Section 03 3010 - Cast-in-Place Concrete for Exposed Concrete Floors.

D. Section 03 3680 - Concrete Polishing.

1.03 SUBMITTALS

A. Contractor shall submit specified manufacturer's complete technical data sheets for all products to be used, including installation instructions.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of specified sealer shall have a minimum TEN (10) years experience in the production of the specified products.

B. Contractor Qualifications: Contractor must have a minimum FIVE (5) years experience in sealing applications and successfully completed not less than SIX (6) projects comparable in scale and complexity.

C. Regulatory Requirements
   1. Products shall comply with the United States Clean Air Act for maximum Volatile Organic Compound (VOC) content as specified in PART 2 of this section.

D. Mockups and Field Samples: Prepare field sample at project site for architects review and approval.
   1. Samples shall be constructed on site and shall be 4'x4'. If there is existing concrete, the Architect shall select an area where the samples will be placed.
   2. Construct sample-using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels.
   3. Sample shall be sealed by the individual workers who will actually be performing the work for the project.
   4. Obtain written approval of the sample from project Architect before start of work.
   5. Retain approved samples through completion of the work for use as a quality standard for finished work.
   6. The mockup may remain part of the finished work if approved.

E. Mandatory Pre-Pour Installation Conference: Conduct conference at project site to comply with requirements in Section 01 0150 - Special Conditions.

F. Protection: General Contractor shall protect areas to receive polished concrete finishes at all times during construction to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall begin immediately after the concrete slab is poured:

1. General Contractor to apply Ram Board or Econo-Cover temporary surface protection.
2. All hydraulic powered equipment shall be diapered to avoid staining of the concrete.
3. All vehicle parking shall be prohibited on the finish slab area. If necessary to complete their scope of work, drop cloths shall be placed under vehicles at all times.
4. No pipe cutting machine shall be used on the finished floor slab.
5. Steel shall not be placed on the finish slab to avoid rusting.
6. Acids and acidic detergents will not come in contact with slab.
7. All painters will use drop cloths on the concrete. If paint gets on the concrete, it must be immediately removed.
8. All trades will be informed that the slab must be protected at all times.

G. Environmental Limitations
   1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.
   2. Flatness and levelness
      a. Finish Concrete shall have a minimum Floor Flatness rating of at least 45.
      b. Finish Concrete shall have a minimum Floor Levelness rating of at least 35.
      c. Finish Concrete shall be cured a minimum of 28 days or at which point equipment can be put on the slab and does not displace aggregate.
   3. Application of finish system shall take place a minimum of 21 days prior to fixture & trim installation and/or substantial completion.
   4. Finish Concrete area shall be closed to traffic during finish floor application and after application, for the time as recommended by manufacturer.

H. Concrete Mix Design:
   1. Concrete Mixture shall be 4,000 PSI or higher, non-air entrained.
      a. Any admixtures, plasticizers, slag, fly ash or anything taking the place of Portland-based cement shall be kept to a minimum.
      b. The cement shall be Portland Cement Type I, conforming to ASTM C 150.
      c. Maintain concrete temperature below 85 degrees. Keep concrete as cool and moist for as long as possible. In essence, decrease rate of hydration and drying to minimize cracking.
      d. Wet cures are most suitable, but if this cannot be achieved, use a dissipating cure and seal only.
      e. All mix designs must be approved by Architect. Send all approved mix designs to Installer/Applicator.
      f. The Engineer/Architect shall determine the saw cut pattern, color and layout.
      g. Color loads for integral color should never be smaller than three (3) cubic yards.
      h. Use one (1) source for cement, aggregates and pozzolans throughout the job. Monitor and control incoming material consistency. Do not use calcium chloride-based admixtures. Non-chloride admixtures may be used.
      i. Wash out all drums before loading. Keep slumps consistent with a maximum of four (4). Minimize driver added water maintaining a .45 water content ratio.
      j. Place concrete to achieve as true and smooth a top surface as possible. Mounds, or dips are not acceptable. GC shall control overall flatness and levelness, including on sloping areas to within tolerances permitted by specification - ASTM E1155.
      k. Slab shall be protected from indention and footprints during pour and curing.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver the specified products in original, unopened containers with legible manufacturer's identification and information.

B. Store specified products in conditions recommended by the manufacturer.

1.06 JOB SITE CONDITIONS

A. Environmental Conditions: Maintain an ambient temperature of between 50° F and 90° F during application and at least 48 hours after application.

B. Protection: Precautions shall be taken to avoid damage or contamination of any surfaces near the work zone. Protect completed stain work from moisture or contamination.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Euclid Chemical: www.euclidchemical.com.

B. Ameripolish 3D HS; Ameripolish, Inc.

C. Prosoco, Inc.: www.prosoco.com.

D. Dayton Superior Corporation: www.daytonsuperior.com.

E. Substitutions: See Section 01600 - Product Requirements.

2.02 PRODUCTS

A. Densifier: a concrete hardener chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless which hardens and densifies concrete surfaces to protect against abrasion, dusting, and absorption of liquids.
   1. Basis of Design: EUCO Diamond Hard.

B. Control Joint and Saw Cut Filler, two part polyurea.
   1. Hi-Tech HT-PE85; Hi-Tech Systems.
   2. Spal-Pro RS-88; Metzger/McGuire.
   3. Euclid QuickJoint 200, (Grey Only); Euclid Chemical Company.

C. Substitutions: The use of any products other than those specified will be considered providing that the contractor requests its use in writing within fourteen (14) days prior to bid date. This request shall be accompanied by:
   1. A certificate of compliance from the material manufacturer stating that the proposed products meet or exceed the requirements for this specification.
   2. Documented proof that the proposed material has a five (5) year proven record of performance for sealing, hardening and densifying concrete substrates, confirmed by at least two (2) local projects that the Architect can examine.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Contractor shall examine areas and conditions under which work will be performed and identify conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. New Concrete
   1. Apply sealer/densifier immediately after final finishing and installation of control joints (if manufacturer's recommendations permit); when the concrete surface won't be marred by foot traffic and after joints have been cut and cleaned or anytime thereafter. Remove soft cut saw debris prior to applying sealer/densifier. Surface shall be swept, and mopped or
   2. pressure-washed as necessary to insure no dirt, grit, trash, or similar items mar finished product. Remove all markings, including paint, marker or pencil marks. Inspect floor surface prior to application to be sure it is ready for sealer/densifier.

B. Existing Concrete

1. Remove all dirt, debris, or curing compounds using appropriate surface prep cleaner. Allow cleaning waters used in surface preparation to dry.

C. Final Saw-Cutting
1. Layout and cut precise edges at over-poured floor depressions and slab edges and remove excess concrete material to the depth of the depression.

3.03 APPLICATION OF SEALER

A. New Concrete
1. The surface shall be sealed with a sealer produced of the type specified under Products above.
a. Also apply manufacturer's protection coat as specified above.
2. Apply at the rates and method recommended by manufacturer in written instructions which the installer shall have at the job site.
3. Apply a single coat using low pressure sprayer fitted with 0.5 gal/min spray tip. Lightly apply sufficient product to wet the surface without producing puddles. Use clean, soft bristle push broom or microfiber pad to spread the product evenly and ensure uniform wetting. Avoid spreading once drying begins. Scrubbing is not necessary.
4. If surfaces dry immediately, increase the rate of application. Surfaces should remain wet 5 to 10 minutes. Adjust rate of application to eliminate puddles. Any white residue must be removed immediately.
5. Allow treated surfaces to dry.
6. For uncured steel troweled concrete, immediately apply the specified curing compound or initiate specified curing procecure.
7. When the curing process is complete, use an automatic floor scrubber equipped with cleaning pads or brushes appropriate for removal of accumulated construction soiling and surface residues. Avoid pads or brushes which may damage the finished floor.

B. Existing Concrete
1. The surface shall be sealed with a sealer produced of the type specified under Products above.
a. Also apply manufacturer's protection coat as specified above.
2. Apply at the rates and method recommended by manufacturer in written instructions which the installer shall have at the job site.
3. Apply a single coat using low pressure sprayer fitted with 0.5 gal/min spray tip. Lightly apply sufficient product to wet the surface without producing puddles. Use clean, soft bristle push broom or microfiber pad to spread the product evenly and ensure uniform wetting. Avoid spreading once drying begins. Scrubbing is not necessary.
4. If surfaces dry immediately, increase the rate of application. Surfaces should remain wet 5 to 10 minutes. Adjust rate of application to eliminate puddles. Any white residue must be removed immediately.
5. Allow treated surfaces to dry.
6. Remove any dried powder residue using a stiff broom, power sweeper, or auto-scrubbing machine.
7. Dry-Buff or burnish concrete surface in both directions with orbital floor machine or burnisher equipped with appropriate polishing pad for additional surface sheen.

3.04 PROTECTION

A. Protection: General Contractor shall protect areas to receive sealed concrete finish at all times during construction to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall begin immediately after the concrete slab is poured.

B. Do not allow any trade to park any vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.

C. Diaper all hydraulic powered equipment to avoid staining of the concrete.

D. Place no steel on interior slab to avoid rust stains and gouges. If construction dictates necessity of this, interior slab will be protected with 1/2-inch plyboard.

E. Do not allow acids and acidic detergents to come into contact with slab.

F. Inform all trades that the slab must be protected at all times.

G. Protect finished work until fully cured in accordance with manufacturer's recommendations.

H. Protect completed floor from damage until Substantial Completion.
   1. Do not allow vehicle and pedestrian traffic on unprotected floor.
   2. Do not allow construction materials, equipment, and tools on unprotected floor.

I. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed floor.

J. Repair damaged areas of completed floor to satisfaction of Architect.

K. Protect floor from traffic for at least 72 hours after final application of sealer.

L. Plywood slab protection in traffic corridors, entry ways, and areas to receive sealer shall be provided by and maintained by General Contractor throughout construction until the finishing contractor takes ownership of the floor. Protection shall be sufficient to protect surface from damage due to traffic and impact from any and all construction activities with a minimum of 1/2" plywood. All seams of plywood shall be sealed to eliminate passage of debris to new floor.

M. Protect slab during masonry work and after completion of sealer work with minimum of 1/2-inch plyboard, with sealed seams.

N. Upon completion of sealer, the General Contractor and the finishing subcontractor shall replace the plywood protection for the duration of the project.

3.05 MAINTENANCE

A. Sealed floors should be maintained by sweeping. Spills should be cleaned when they occur and dirt shall be rinsed off with water. Heavily soiled areas may be wet-cleaned by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and a suitable, high quality commercial detergent. Interior floors that require polishing should be maintained using a compatible, premium-grade, emulsion-type, commercial floor polish, following manufacturer's instructions and safety requirements.

END OF SECTION

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SECTION 03 3680
CONCRETE POLISHING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes polished concrete finish for interior concrete floors denoted on Finish Schedule as PC (Polished Dyed Concrete).

B. This section also includes the epoxy college seal to be installen in the lobby floor with zinc terazzo strips and epoxy coatings.

C. Furnish all labor, material, equipment and services necessary for the dry diamond grinding and polishing of concrete floors.

D. Applying densifying impregnator/sealer and polishing to specified sheen level and aggregate exposure.

E. Concrete must be cured a minimum of 28 days prior to polishing.

F. PROTECTION OF CONCRETE SLABS DURING CONSTRUCTION.

1.02 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete materials, placing, and finishing.

C. Section 03 3010 - Cast-in-Place Concrete for Exposed Concrete Floors.

D. Section 03 3660 - Sealed Concrete Floors.

1.03 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI302.1R-89, Guide for Concrete Floor and Slab Construction.

B. American Society for Testing and Materials:
   1. ASTM C779, Standard Test Method for Abrasion of Horizontal Concrete Surfaces.
   2. ASTM C805, Impact Strength.
   3. ASTM G23-81, Ultraviolet Light & Water Spray.
   4. ASTM 1028, Co-efficient of Friction.
   5. ASTM C 150, Type I, II Portland cement conformity, depending on soil conditions.
   6. ASTM C 33, Aggregate conformity.

C. Other Tests:
   1. Reflectivity.

1.04 SUBMITTALS

A. Submit the following in accordance with Submittal Procedures in Division 1 Sections.

B. Product data for concrete densifying impregnator, penetrating sealer, concrete dyes, joint filler and any other chemicals used in the process.

C. Applicators qualification data.

D. Polished concrete samples: size 3"x3" for each Polished Concrete finish required.

E. Maintenance procedures for Polished Concrete using diamond impregnated cleaning pads.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of specified sealer shall have a minimum TEN (10) years experience in the production of the specified products.

B. Contractor Qualifications: Contractor must have a minimum FIVE (5) years experience in sealing applications and successfully completed not less than SIX (6) projects comparable in scale and complexity.
   1. Installer/applicator shall be certified by concrete grinding/polishing equipment, chemical manufacturer and caulking manufacturer. Installer/applicator shall provide adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
   2. Manufacturer's Certification: Provide a letter of certification from both the equipment and chemical manufacturer stating that the installer is a Certified Contractor and is familiar with proper procedures and installation requirements recommended by the manufacturer.
   3. Provide project names, addresses, contact names, phone numbers of at least SIX (6) projects of similar scope and size completed by the installer.

C. Mock-ups:
   1. General Contractor to notify applicator 7 days prior to pour to schedule finish of mock-up.
   2. Reserve 100 square feet for each color and finish at location adjacent to floor that will receive polish, but will be covered with another flooring material. Mock-up floor shall be placed on the same day, preferably the same pour as the floors to receive polish.
   3. Install mock-ups to verify selections made under sample submittal and to demonstrate methods and workmanship proposed for the project. If mock-up not possible, submitted samples will be accepted as demonstrated methods & workmanship.
   4. If stand-alone mockup required, form should be clean and free from extraneous substance and be at least a 10' x 10' with a level plywood bottom on level ground with unobstructed access around all four sides.
   5. Control joints should be included in mock-up. Sawing performed by General Contractor can begin as soon as the surface is firm enough not to displace any of the aggregate.
   6. Edges should be included in mock-up.
   7. Approved mock-ups may become part of the completed work if undisturbed at time of substantial completion.
   8. Provide protection for Mock-up as specified for finished areas.

D. Mandatory Pre-Pour Installation Conference: Conduct conference at project site to comply with requirements in Section 01 0150 - Special Conditions.

E. Protection: General Contractor shall protect areas to receive polished concrete finishes at all times during construction to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall begin immediately after the concrete slab is poured:
   1. General Contractor to apply Ram Board or Econo-Cover temporary surface protection.
   2. All hydraulic powered equipment shall be diapered to avoid staining of the concrete.
   3. All vehicle parking shall be prohibited on the finish slab area. If necessary to complete their scope of work, drop cloths shall be placed under vehicles at all times.
   4. No pipe cutting machine shall be used on the finished floor slab.
   5. Steel shall not be placed on the finish slab to avoid rusting.
   6. Acids and acidic detergents will not come in contact with slab.
   7. All painters will use drop cloths on the concrete. If paint gets on the concrete, it must be immediately removed.
   8. All trades will be informed that the slab must be protected at all times.

F. Environmental Limitations:
   1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.
   2. Flatness and levelness:

a. Finish Concrete shall have a minimum Floor Flatness rating of at least **45**.
b. Finish Concrete shall have a minimum Floor Levelness rating of at least **35**.
c. Finish Concrete shall be cured a minimum of 28 days or at which point equipment can be put on the slab and does not displace aggregate.

3. Application of finish system shall take place a minimum of 21 days prior to fixture & trim installation and/or substantial completion.
4. Finish Concrete area shall be closed to traffic during finish floor application and after application, for the time as recommended by manufacturer.

G. Concrete Mix Design:
1. Concrete Mixture shall be 4,000 PSI or higher, non-air entrained.
a. Any admixtures, plasticizers, slag, fly ash or anything taking the place of Portland-based cement shall be kept to a minimum.
b. The cement shall be Portland Cement Type I, conforming to ASTM C 150.
c. Maintain concrete temperature below 85 degrees. Keep concrete as cool and moist for as long as possible. In essence, decrease rate of hydration and drying to minimize cracking.
d. Wet cures are most suitable, but if this cannot be achieved, use a dissipating cure and seal only.
e. All mix designs must be approved by Architect. Send all approved mix designs to Installer/Applicator.
f. The Engineer/Architect shall determine the saw cut pattern, color and layout.
g. Color loads for integral color should never be smaller than three (3) cubic yards.
h. Use one (1) source for cement, aggregates and pozzolans throughout the job. Monitor and control incoming material consistency. Do not use calcium chloride-based admixtures. Non-chloride admixtures may be used.
i. Wash out all drums before loading. Keep slumps consistent with a maximum of four (4). Minimize driver added water maintaining a .45 water content ratio.
j. Place concrete to achieve as true and smooth a top surface as possible. Mounds, or dips are not acceptable. GC shall control overall flatness and levelness, including on sloping areas to within tolerances permitted by specification - ASTM E1155.
k. Slab shall be protected from indention and footprints during pour and curing.

PART 2 - PRODUCTS

2.01 POLISHING MATERIALS

A. Three-phase 480 Volt generator.

B. 3 head or 4 head counter rotating, variable speed, electric floor grinding/polishing machines with at least 600 pounds down pressure. For example: HTC 950RX, HTC 800 HD, SASE PDG 8000, Husqvarna PG 820. No substitutions allowed.

C. HTC/Pullman Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute such as the HTC 75D, HTC 86D, T8600, T12600, Bull 500, Bull 1250 & T55 or C5500. No substitutions allowed.

D. Grinding tools:
1. Metal bonded diamonds 40, 80 and 150 metal or QuickCut transitional.
2. Resin bonded diamonds 100, 200, 400 and 800 grits.

E. Grinding Pads for Edges:
1. Metal bonded diamonds 50 and 100 grits.
2. Resin bonded diamonds 100, 200, 400 and 800 grits.

F. Hand Grinder with dust extraction attachment and pads.

G. Densifier: A concrete hardener chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless which hardens and densifies concrete surfaces to protect against abrasion, dusting, and absorption of liquids.
   1. Ameripolish 3D HS; Ameripolish, Inc.
   2. Consolideck LS; PROSOCO
   3. Scofield Formula One MP; Sika/Scofield
   4. No substitutions allowed.

H. Control Joint and Saw Cut Filler, two part polyurea.
   1. Hi-Tech HT-PE85; Hi-Tech Systems
   2. No substitutions allowed.

I. Dye: A penetrating dye that chemically combines with cured concrete to produce permanent, variegated or translucent color effects.
   1. Ameripolish Dye; Ameripolish, Inc.
   2. Gemtone Stain; PROSOCO
   3. No substitutions allowed.

J. Penetrating Stain Guard: Protection from debris and contaminants
   1. Ameripolish 3D SP; Ameripolish, Inc.
   2. Consolideck LS Guard; PROSOCO
   3. Scofield Formula One Guard-W; Sika/Scofield
   4. No substitutions allowed.

K. Stain Resistor/Inhibitor: Additional protection for food service areas.
   1. Ameripolish SR2 Stain Resistor; Ameripolish, Inc.
   2. Consolideck Concrete Protector; PROSOCO
   3. No substitutions allowed.

L. Diamond Impregnated Burnishing Pads
   1. Trifecta Pads; SASE Company, Inc.
   2. Twister Pads; HTC
   3. HiperClean Pads; Husqvarna
   4. No substitutions allowed.

M. Epoxy Floor Coatings: Type recommended by the manufacturer for this application.

PART 3 - EXECUTION

3.01 PREPARATION

A. Installer shall examine and approve concrete substrate for conditions affecting performance of finish. General Contractor shall correct conditions that are found to be out of compliance with the requirements of this section. Repairs are not acceptable unless specifically approved on a case-by-case basis by the Architect.

B. Verify that base slab meet finish and surface profile requirements listed in Division 3, Section “Cast in Place Concrete”.

C. Provide floor clean of materials and debris.

D. Protect adjacent surfaces as required to prevent damage by the concrete polishing procedure.

E. Setup grinding machine, dust extraction system, tooling, and generator.

F. Ensure floor cured to accept polishing application.

G. Final Saw-Cutting:
   1. Layout and cut precise edges at over-poured floor depressions and slab edges and remove excess concrete material to the depth of the depression.

3.02 POLISHED CONCRETE APPLICATION

A. Applicator shall examine the areas and conditions under which work of this section will be provided and the General Contractor shall correct conditions detrimental to the timely and proper completion of the work and the Applicator shall not proceed until unsatisfactory conditions are resolved.

B. Fill construction joints and cracks with filler products as specified in accordance with manufacturer's instructions colored to match (or contrast) with concrete color as specified by architect. All control joint and decorative saw cut filling must be performed prior to grinding application.

C. Saw cut recessed floor mat and recessed tile slab edges to final dimension at locations of overpoured conrete. Remove excess concrete to depth of recess.

D. Grind the concrete floor to within 2 -3 inches of wall with 40 grit metal, 80 grit metal and 150 grit metal or QuickCut transitional diamonds removing construction debris, floor slab imperfections and until there is a uniform scratch pattern and desired concrete aggregate exposure is achieved. Each subsequent grind shall be at 90 degrees from each previous grind and remove all the scratches from the previous grind. Vacuum the floor thoroughly using a squeegee vacuum attachment. Utilize the least aggressive diamond tooling necessary to remove all debris and to achieve uniform scratch pattern. Final surface finish to be salt and pepper.

E. Grind the edges with 50 and 100 grit metal grinding pads, prior to grinding the floor with each step on the larger diamond grinder, removing all of the scratches from the previous grit. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.

F. Polish the floor with resin bonded diamond grits of 100, 200, 400, first polishing the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each polish, clean the floor thoroughly using a vacuum with a squeegee attachment. After the 400 grit polishing step thoroughly clean the floor with a mop or auto-scrubber.

G. If specified, apply dye color per manufacturer's recommendations. Apply two coats of dye to achieve desired coloration.

H. Apply densifying impregnator undiluted as per manufacturer's specifications and guidelines. Cover the entire work area liberally and allow to sit for 10 minutes. Apply again to areas where the densifying impregnator has soaked in and allow to sit for an additional 30 minutes. Squeegee excess material off the floor.

I. Polish the floor with resin bonded diamond grit of 800, first polishing the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After polishing, clean the floor thoroughly using clean water and an auto-scrubber or a mop and a wet vacuum.

J. Apply Penetrating Stain Guard with a microfiber applicator and burnish with a fine, 800 grit, or very fine, 1500 grit, diamond impregnated polishing pad.

K. Where required, apply Stain Resistor/ Inhibitor with a microfiber applicator and burnish with a fine, 800 grit, or very fine, 1500 grit, diamong imprednated burnishing pad.

L. Upon completion, the work shall be ready for final inspection and acceptance by the customer.

3.03 PROTECTION

A. General Contractor to apply Skudo LT (Light Traffic), Ram Board or Econo-Cover temporary surface protection.

B. Do not allow any trade to park any vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.

C. Diaper all hydraulic powered equipment to avoid staining of the concrete.

D. Protect slab after completion of polishing and dyeing work with Ram Board floor protection cover, Econo-Cover or equal. Overlap and tape seams.

E. Place no steel on interior slab to avoid rust stains and gouges. If construction dictates necessity of this, interior slab will be protected with 1/2-inch plyboard.

F. Do not allow acids and acidic detergents to come into contact with slab.

G. Inform all trades that the slab must be protected at all times.

H. Protect finished work until fully cured in accordance with manufacturer's recommendations.

I. Protect completed floor from damage until Substantial Completion.
   1. Do not allow vehicle and pedestrian traffic on unprotected floor.
   2. Do not allow construction materials, equipment, and tools on unprotected floor.

J. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed floor.

K. Protect floor from traffic for at least 24 hours and from water for at least 72 hours after completion of polishing and dyeing.

PART 4 - SCHEDULES

4.01 SHEEN

A. Polished Concrete Level 1 - 400 grit (Matte Finish):
   1. At a distance of 30 to 50 feet, the floor will receal moderate light reflection.
   2. Yield an average gloss reading of 20 - 40, as measured by a Horiba Gloss Meter.

B. Polished Concrete Level 2 - 800 grit (Medium Gloss Finish):
   1. At a distance of 30 to 50 feet, the floor will reveal moderate light reflection.
   2. Yield an average gloss reading of 40 - 60, as measured by a Horiba Gloss Meter.

4.02 EXPOSED AGGREGATE

A. Minimal exposure, Salt and Pepper

4.03 DYE COLOR

A. See finish schedule for dye color(s).

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Concrete building brick.

C. Clay facing brick.

D. Mortar and grout.

E. Reinforcement and anchorage.

F. Flashings.

G. Accessories.

H. Water Repellent and Efflorescence Control Admixtures.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract including Supplementary Conditions and Division 01 Specification Sections apply to the Section.

B. Section 01 2100 - Allowances: Face Brick Allowance.

C. Section 01 4000 - Quality Requirements: Requirements for Mock-ups.

D. Section 03 3660 - Sealed Concrete Floor: Protection of concrete slabs during masonry work.

E. Section 03 3680 - Concrete Polishing: Protection of concrete slabs during masonry work.

F. Section 03 3931 - Curing, Sealing, and Hardening Concrete Floors: Protection of concrete slabs during masonry work.

G. Section 05 5000 - Metal Fabrications: Loose steel lintels.

H. Section 06 1000 - Rough Carpentry: Nailing strips built into masonry.

I. Section 07 1113 - Bituminous Dampproofing: Dampproofing parged masonry surfaces.

J. Section 07 1400 - Fluid Applied Air Barriers: Spray-applied Air Barriers on masonry surfaces.

K. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.

L. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

M. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2100 - Allowances, for cash allowances affecting this section.

B. All requirements of this Section shall be included in the Contract Sum/ Price except the specific item itemized in the following enumerated paragraph.

1. Allowance No. 01 - Brick Veneer Masonry: This allowance includes purchase and delivery of face brick veneer material. Installation is not included in the allowance but is specified in this Section and is part of the Contract Sum/Price.

1.04 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019 (Reapproved 2025).

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

G. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2026.

H. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

J. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.

K. ASTM C55 - Standard Specification for Dry-Cast Concrete Building Brick; 2025.

L. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2025.

M. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units; 2024a.

N. ASTM C91/C91M - Standard Specification for Masonry Cement; 2025.

O. ASTM C129 - Standard Specification for Dry-Cast Nonloadbearing Concrete Masonry Units; 2025.

P. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2026.

Q. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2025.

R. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

S. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars; 2022.

T. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2024.

U. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2026.

V. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2025b.

W. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.

X. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

Y. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale); 2022.

Z. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2025a.

AA. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.

BB. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2024.

CC. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.

DD. BIA Technical Notes No. 28B - Brick Veneer/Cold-Formed Steel Framed Walls; 2025.

EE. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

FF. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

GG. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

HH. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

II. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
   1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.
   2. Include the design engineer's stamp or seal on each sheet of shop drawings.

D. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.

E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

F. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

G. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.07 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Fire Rated Assemblies: Comply with applicable code for UL requirements for fire rated masonry construction.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience with demonstrated relevant experience defined as having successfully completed a minimum of five (5) projects of similar size and complexity.

Where requested by the Architect, the Subcontractor shall furnish the names and contact information for the General Contractors for relevant experience confirmation.

E. Single Source Responsibilities.
   1. Water Repellents: Obtain each type of integral water repellant from a single manufacturer for the entire project.
      a. Compatibility Confirmation: Verify water repellent is compatible with all masonry wall system compenents including, but not limited to, flashings and coatings, facing brick and masonry units, mortars and grouts. Notify Architect in writing in detail of any non-compatible products prior to any application of the product and await Architect's instruction before proceeding.
   2. Through-Wall Flashings: Self-adhering membrane flashings associated with through-wall flashings in the Section shall be manufactured by the manufacturer of the Air/ Water Barrier specified in Section 07 1400 - Fluid Applied Air Barrier for material compatibility and single-source manufacturing responsibility.

1.08 MOCK-UPS

A. Integrate materials of this Section into the Exterior Assembly Mock-up per the drawing requirements, including mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.

B. Locate where directed.

C. Mock-up may not remain as part of work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Store cementitous material and insulation off the ground and under cover in a dry location.

C. Store aggregates where grading and similar required characteristics can be maintained and contamination avoided.

D. Store masonry accessories in a manner that prevents accumulation of dirt and oil.

E. Store water repellants in strict accordance with manufacturer's printed instructions.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ ASCE 6/ TMS 602 and applicable Building Code.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. Special Shapes: Provide nonstandard blocks configured for corners, lintels, headers, control joint edges, and other detailed conditions.
      a. Provide bullnose units for all outside corners that are exposed at the interior of the building.
   3. Load-Bearing Units: ASTM C90, lightweight or normal weight as required.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer's standard color and texture.
      c. Unit Compressive Strength: Provide units with minimum compressive strength as indicated on the drawings.

d. Provide normal weight units where required for compliance with UL Rated Assemblies at fire-rated walls and partitions.

4. Nonloadbearing Units: ASTM C129, lightweight or normal weight as required.
   a. Hollow block, as indicated.
   b. Exposed Faces: Manufacturer's standard color and texture.
   c. Unit Compressive Strength: Provide units with minimum compressive strength as indicated on the drawings.
   d. Provide normal weight units where required for compliance with UL Rated Assemblies at fire-rated walls and partitions.

B. Concrete Brick:
   1. Size: As indicated on drawings.
   2. Concrete Building Brick: ASTM C55; lightweight, solid, for interior or concealed use.

2.02 BRICK UNITS

A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
   1. Facing Brick material shall be purchased under an Allowance item. See Section 01 2100 - Allowances.
   2. Color and texture: To be selected.
   3. Nominal size: Standard modular brick units.
   4. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   5. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.

2.03 MORTAR AND GROUT MATERIALS

A. Manufacturers:
   1. Argos US; www.argos-us.com..
   2. Amerimix; www.amerimix.com..
   3. Lehigh Hanson; www.lehighhanson.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Colored Masonry Cement: ASTM C91/C91M, Type N.
   1. Colored Masonry Cement: Premixed cement as selected by Archtect from manufacturer's full sample range of at lease thirty (30) colors.

C. Portland Cement: ASTM C150/C150M, Type I.

D. Hydrated Lime: ASTM C207, Type S.

E. Mortar Aggregate: ASTM C144.

F. Grout Aggregate: ASTM C404.

G. Water: Clean and potable.

H. Accelerating Admixture: Nonchloride type for use in cold weather.

I. Water Repellent and Efflorescence Control Admixture for Mortar at Brick Veneer only: Polymeric liquid or powder admixture added to mortar at the time of manufacture compliant with ASTM E 514.
   1. Acceptable Products: Master Builders "MasterPel 240 Mortar Admizture", or equivalent.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
   1. Basis of Design: Hohmann & Barnard, Inc: www.h-b.com/#sle.
   2. Other Acceptable Manufacturers:

a. WIRE-BONDwww.wirebond.com/#sle.
b. York Manufacturing Inc.: www.york-mfg.com.
c. Heckmann Building Products: www.heckmannbuilding products.com.

3. Substitutions: See Section 01 6000 - Product Requirements.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

C. Joint Reinforcement: Use ladder type joint reinforcement unless truss type is specifically indicated.

D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Product: 220 Ladder Mesh - SHD.
2. Type: Ladder.
3. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
4. Size: 0.1875 inch side rods with 0.1875 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

E. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
1. Product: 230 Ladder Tri-Mesh - SHD.
2. Type: Ladder.
3. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
4. Size: 0.1875 inch side rods with 0.1875 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

F. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
1. Product: 270-2X Ladder Eye-Wire - SHD.
2. Type: Ladder, with adjustable ties or tabs spaced at 16 in on center.
3. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
4. Size: 0.1875 inch side rods with 0.1875 inch cross rods and adjustable components of 0.1875 inchwire, width of components as required to provide not less than 5/8 inch of mortar coverage from each masonry face.
5. Vertical adjustment: Not more than 1 1/4 inches.
6. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.

G. Strap Anchors: Bent steel shapes, 1-1/2 inch width, 3/16 inch thick, 24 inch length, with 1-1/2 inch long, 90 degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153/A153M Class B.
1. Product: 344 Rigid Partition Anchor.

H. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.024 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
a. Product: 305 Dovetail Slot with 315 Flexible Dovetail Brick Tie.
2. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
a. Product: 359 Weld-on Anchor Rod with 301W Column Web Ties.

I. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not less than 5/8 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

1. Product: HB-5213 Adjustable Veneer Anchor.
2. Anchor plates: Not less than 0.105 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
3. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
4. Vertical adjustment: Not less than 1-1/4 inches.

J. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not less than 5/8 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.
1. Product: HB-213 Adjustable Veneer Anchor.
2. Anchor plates: Not less than 0.105 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
3. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
4. Vertical adjustment: Not less than 1-1/4 inches.

K. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

2.05 FLASHINGS

A. Manufacturers:
1. Basis of Design: Hohmann & Barnard, Inc: www.h-b.com/#sle.
2. Other Acceptable Manufacturers:
a. WIRE-BONDwww.wirebond.com/#sle.
b. York Manufacturing Inc.: www.york-mfg.com.
c. Heckmann Building Products: www.heckmannbuilding products.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Metal Flashing Materials:
1. Stainless Steel Flashing: ASTM A666/A666M, Type 304, soft temper; 26 gauge, 0.0187 inch thick; finish 2B to 2D.

C. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
1. Stainless Steel/Polymer Fabric Flashing - Self-adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on inward facing side to a sheet of polymer fabric that has a clear adhesive with a removable release liner.
a. Product: Mighty-Flash Stainless Flashing - SA.

D. Membrane Non-Asphaltic Flashing Materials:
1. Application: Conditions where stainless steel flashings may corrode or adversely affect adjacent building products only.
2. Product: Textroflash.
3. Composite Polymer Flashings - Self-Adhering: Composite polyethylene; 40 mil thick with pressure-sensitive adhesive and release paper.

E. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.
1. Product: MFL Metal Flashing.
2. Thickness: 26 gage.

F. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

G. Termination Bars: Stainless steel; compatible with membrane and adhesives.
1. Product: T1 of T2 Terminiation Bar as applicable to condition.

H. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.
   1. Product: MLF Metal Flashing.
   2. Thickness: 26 gage.

I. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.06 ACCESSORIES

A. Manufacturers:
   1. Basis of Design: Hohmann & Barnard, Inc: www.h-b.com/#sle.
   2. Other Acceptable Manufacturers:
      a. WIRE-BONDwww.wirebond.com/#sle.
      b. York Manufacturing Inc.: www.york-mfg.com.
      c. Heckmann Building Products: www.heckmannbuilding products.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Product: RS Series Rubber Control Joints.
   2. Size: As required based on condition.

C. Joint Filler: Closed cell polyethylene; oversized 50 percent to joint width; self expanding; in maximum lengths available.
   1. Product: Backer Rod - Standard.
   2. Size: As required based on condition.

D. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Product: Mortar Trap.
   2. Size: As required based on condition.

E. Weeps:
   1. Product: 343 Weep Hole.
   2. Type: Molded PVC grilles, insect resistant.
   3. Color(s): As selected by Architect from manufacturer's full range.

F. Cavity Vents:
   1. Product: Quadro-Vent.
   2. Type: Molded PVC grilles, insect resistant.
   3. Color(s): As selected by Architect from manufacturer's full range.

G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Masonry below grade and in contact with earth: Type M.
   2. Exterior, loadbearing masonry: Type S.
   3. Exterior, non-loadbearing masonry: Type N.
   4. Interior, loadbearing masonry: Type S.
   5. Interior, non-loadbearing masonry: Type N.

B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Do not proceed until all unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

C. Masonry work shall be coordinated with electrical, mechanical, plumbing, and any other trade that will have in-wall work.

D. Where adjacent flooring is to receive concrete sealing and staining, polishing and/or dyeing, provide minimum 1/2" plywood protection over the floor slab, which should be protected under Section 03 3660 - Sealed Concrete Floor, and Section 03 3680 - Concrete Polishing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

D. Brick Units:
   1. Bond: Running.
   2. Coursing: Three units and three mortar joints to equal 8 inches.
   3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

B. Install cavity vents in veneer and cavity walls at 48 inches on center horizontally below shelf angles and lintels and near top of walls.

3.07 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions.
   1. Verify that airspace width is no more than 3/8 inch greater than panel thickness.
   2. Hold cavity mortar control panel tight to face wythe.
   3. Install horizontally between joint reinforcement.
   4. Stagger end joints in adjacent rows.
   5. Fit to perimeter construction and penetrations without voids.

D. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

F. Reinforce joint corners and intersections with strap anchors 24 inches on center.

G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

H. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 32 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.10 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up flashing ends at least 1 inch, minimum, to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Terminate flashing up 8 inches minimum on vertical surface of backing:
   1. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer’s directions.
   2. Anchor vertical leg of flashing into backing with a termination bar and sealant.
   3. Apply cap bead of sealant on top edge of self-adhered flashing.

C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.

D. Extend metal flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

E. Support flexible flashings across gaps and openings.

F. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.11 LINTELS

A. Install loose steel lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled in compliance with the requirements of the Structural drawings.

3.12 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Provide Control Joints at locations indicated, but not to exceed the following as continuous straight runs of masonry construction:
   1. Exterior and Interior Brick Walls: 25' - 0" o.c. maximum continuous run of brick masonry.
   2. CMU Walls: 25' - 0" o.c. maximum continuous run of CMU walls.
   3. Corners: Provide one (1) Control Joint within 2' - 0" of each corner constructed of Brick or CMU walls.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

D. Size control joints as indicated on drawings; if not indicated, 3/8" inch wide up to 16' - 0" spacing, 1/2" wide up to 22' - 0" spacing, and 5/8" wide up to 30' - 0" spacing.

E. Form expansion joint as detailed on drawings.

F. Joints shall be clear of mortar. Seal with silicone sealant with optional compressible joint filler.

3.14 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

H. Maximum Variation for Vertical Alignment of Head Joints: 1/4 inch in 10 ft, 1/2" maximum.

3.16 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - QUALITY REQUIREMENTS.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.18 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.19 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

B. Protect masonry cavity during erection from exposure to rainfall each day until the cavity is permanently sealed.

C. Protect competed masonry work from staining and or damage from construction activities.

END OF SECTION

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SECTION 05 1200

STRUCTURAL STEEL

PART 1 – GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Structural steel work including schedules, notes and details showing size and location of members, typical connections, and type of steel required.
2. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
3. Related work specified elsewhere:
   a. Miscellaneous Metal Fabrications are specified elsewhere in Division 5
   b. Refer to Division 3 for anchor bolt installation in concrete, Division 4 for anchor bolt installation in masonry.

B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 05 5000, "Metal Fabrications": Loose steel bearing plates and miscellaneous steel framing.

1.2 PERFORMANCE REQUIREMENTS:

A. Structural Performance: Engineer structural steel members and connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

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.

1.3 SUBMITTALS:

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

1. Submit all shop drawings on one reproducible print (sepia) and two blue line prints only. The reproducible print will be returned. All blue line prints 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.
5. Welder's certificates
6. Submit evidence of fabricator and erector qualifications.

C. Shop Drawings prepared under the supervision of, signed and sealed by a Licensed Professional Engineer, 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.
2. Welds: Indicate welds by standard AWS A2.1 and A2.4 symbols. Distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Bolts: Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
4. Setting Drawings: Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorage's to be installed by others.
5. Erection Drawings: Prepare and furnish to the Architect for review, erection drawings, detailed shop drawings and connection design calculations for all structural steel. Manufacturing of any material or performing of any work before final review of shop drawings will be entirely at risk.
6. Contract documents shall not be used for shop drawing, including erection plans or details.
7. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.
8. Fabrication, assembly and erection shall conform to reviewed shop drawings.

D. Connection Calculations:

1. All structural steel connections 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 of Alabama.
2. Design calculations for the connections 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 of Alabama. Shop drawings containing connections for which calculations have not been received will be returned unchecked as an incomplete submittal.
3. For each connection, the following shall be noted on the shop drawings:
4. Required design reaction.
5. Calculation sheet number for design.
6. Capacity of detailed connection.

E. 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.

F. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.

1. Structural steel, including chemical and physical properties.
2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

1.4 QUALITY ASSURANCE:

A. Erector Qualifications: Engage an experienced Erector who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

C. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. AISC's "Specification for Structural Steel Buildings—Allowable Stress Design and Plastic Design."
2. AISC's "Load and Resistance Factor Design (LFRD) Specification for Structural Steel Buildings."
3. AISC "Specifications for Structural Steel Buildings, Section 10, Architecturally Exposed Structural Steel."
4. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
5. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
6. AISC's "Seismic Provisions for Structural Steel Buildings."
7. 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 extend 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.
   b. Paragraph 3.1:Add the following: "3.1.8 Include in the bid price for the work structural steel members shown on drawings, but not identified as to size, section, and material grade by assuming sizes, sections, and material grades shown for similarly loaded members having approximately the same overall

length except on areas that are noted on the drawings as incomplete. Identify such members and their associated cost in the bid for the work".

c. Paragraph 3.3:Delete the first sentence, "In case of discrepancies between plans and specifications for buildings, the specifications govern", and insert the following in its place, "In case of discrepancies between drawings and specifications for buildings, the drawings govern".

d. Paragraph 3.4:In the first sentence, delete the phrase "and made to a scale not less than 1.8" to the foot".

e. Paragraph 5.1:Delete the first sentence, "When the fabricator receives 'released for construction' plans and specifications, the fabricator may immediately place orders for the material necessary for fabrication". and insert the following in its place "when the fabricator receives 'issued for structural steel mill order of wide flange beams, girders and columns only' plans and specifications, the fabricator may immediately place orders for the material necessary for fabrication". Delete the second sentence, "The contract documents must note any materials or areas which should not be ordered due to a design which is incomplete or subject to revision".

8. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
9. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
10. Research Council on Structural Connections' (RCSC) "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code—Steel."

E. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification in the past year.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. 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.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. 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.

1.6 SEQUENCING:

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.7 TESTING SERVICES:

A. Provide the Testing Laboratory with the following:

1. A complete set of shop and erection drawings reviewed by the Architect.
2. Mill test reports, cutting lists, order sheets, material bills and welder's certificates.
3. Full and ample means and assistance for testing all material.
4. Proper facilities, including scaffolding, temporary work platforms, hoisting facilities, etc., for inspection of the work in the mills, shop and field.

B. Propose procedures, acceptable to the Architect, to correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements.

C. Provide additional tests, by the Quality Control Testing Laboratory, as may be necessary, to reconfirm any noncompliance of the original work, and as may be necessary to show compliance off corrected work.

PART 2 – PRODUCTS

2.1 STEEL 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 Shapes, Plates, and Bars: As follows:

1. Carbon Steel: ASTM A 36 (ASTM A 36M).
2. High-Strength, Low-Alloy Columbium-Vanadium Steel: ASTM A 572 (ASTM A 572M), Grade 50.

C. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

D. Hot-Formed Structural Steel Tubing: ASTM A 501.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

1. Finish: Black, except where indicated to be galvanized.

F. 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.

1. Finish: Black, except where indicated to be galvanized.

G. Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B.

H. Anchor Rods, Bolts, Nuts, and Washers: As follows:

1. Unheaded Rods: ASTM A 36 (ASTM A 36M).

2. Headed Bolts: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel, hex-head bolts; and carbon-steel nuts.
3. Washers: ASTM A 36 (ASTM A 36M).

I. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain, uncoated.

J. Welding Electrodes: Comply with AWS requirements.

2.2 PRIMER:

A. Primer: SSPC-Paint 15, Type I, red oxide.

2.3 GROUT:

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time. Subject to compliance with requirements, provide one of the following:

1. High Performance (Non-Metallic):
   a. “Masterflow 928”; Master Builders.
   b. “Crystex”; L & M Const. Chemical Co.
2. Construction Grade (Non-Metallic):
   a. “Set Grout”; Master Builders.
   b. “Euco-NS Grout”; Euclid Chemical Co.
   c. “Duragrout”; L & M Const. Chemical Co.
   d. “Horn Non-Corrosive Non-Shrink Grout”; A.C. Horn, Inc.
   e. “588 Grout”; W.R. Meadows, Inc.
   f. “Five Stair Grout”; Five Star Products, Inc.

2.4 FABRICATION:

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Camber structural steel members where indicated.
2. Identify high-strength structural steel according to ASTM A 6 (ASTM A 6M) and maintain markings until steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
6. Comply with fabrication tolerance limits of AISC’s “Code of Standard Practice for Steel Buildings and Bridges” for structural steel.
7. Piping and/or cracks in flanges or webs of all rolled shapes or plates are to be removed and welded solid by AISC procedures.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

C. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

D. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.

E. Steel Wall Framing: Select true and straight members for fabricating steel wall framing to be attached to structural steel framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

F. Welded Door Frames: Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches (250 mm) o.c., unless otherwise indicated.

G. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.

1. 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. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

H. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Shop weld shear connectors, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.

2.5 SHOP CONNECTIONS:

A. 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.

B. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.

2.6 SHOP PRIMING:

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed-on fireproofing, [unless otherwise specified].
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:

1. SSPC-SP 2 “Hand Tool Cleaning.”

2.7 SOURCE QUALITY CONTROL:

A. Independent Testing and Inspecting Laboratory: Owner will engage an Independent Testing and Inspecting Laboratory to perform shop inspections and tests and to prepare test reports.

1. Testing laboratory will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
2. Provide testing laboratory with access to places where structural steel work is being fabricated or produced so required inspection and testing can be accomplished.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor’s expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Shop-bolted connections will be tested and inspected according to RCSC’s “Specification for Structural Joints Using ASTM A325 or A 490 Bolts”.

E. In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing laboratory’s option.

1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
2. Ultrasonic Inspection:ASTM E 164.

PART 3 –EXECUTION:

3.1 INSPECTION:

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete [and masonry bearing surfaces] and locations of anchorage's for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

B. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

3.3 ERECTION:

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
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 plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
   a. Comply with manufacturer's instructions for proprietary grout materials.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. 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.

E. Splice members only where indicated.

F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection.

H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS:

A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds ½ inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.

D. Shear Connectors:Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.

3.5 FIELD QUALITY CONTROL:

A. Testing Laboratory Responsibility: The Owner's Testing Laboratory will perform field inspections and tests on and to prepare test reports as follows:

1. Testing Laboratory shall also approve welding certificates. Contractor shall submit three (3) copies of welding certificates and procedures for each welder involved in the Work.
2. Testing Laboratory shall conduct and interpret tests, certificates and procedures and state in each report whether tested Work complies with or deviates from requirements.

B. Quantity of Required Inspections and Tests: Testing Laboratory shall perform the following inspections or tests:

1. Shop Bolted Connections: Inspect or test in accordance with AISC specifications. Inspect ten percent (10%) of all bolts, but not less than two (2) bolts of each connection.
2. Shop Welded Connections: Inspect ten percent (10%) of all welds, other than visual, but not less than one (1) weld at each connection.

C. Provide access for Testing Laboratory to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

D. Deficiencies: Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

E. Field Inspections and Tests: check steel as received in the field for possible shipping damage workmanship, piece making and verification of required camber.

F. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

G. Field-Bolted Connections: Inspect in accordance with AISC specification.

1. For non-slip critical 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.
2. For slip critical bolted connections (friction-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. 50% of all bolts, but not fewer than 25% of the bolts in any one connection shall be tested to assure proper pretension in accordance with AISC specifications.
3. Bolts in slotted holes at expansion joints shall have nuts finger tight with threads damaged.

H. Field Welding: Inspect and test during erection of structural steel as follows:

1. 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.
2. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.
3. Perform tests of welds as follows:
   a. Magnetic Particle Inspection:ASTM E709; performed on root pass and on finished weld. Inspect 20% of the length of each fillet weld. Cracks or zones of incomplete inspected on less than 100% basis shall require inspection of 100% of that weld.
   b. Ultrasonic Inspection:ASTM E164. Perform on all full and partial penetration welds.

3.6 CLEANING

A. 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 a minimum dry film thickness of 1.5 mils (0.038 mm).

B. Touch up Painting: Cleaning and touch up painting of field welds, bolted connections, and abraded areas of shop paint on structural steel are included in Section 09900, "Painting."

END OF STRUCTURAL STEEL

SECTION 05 2100
STEEL JOISTS AND JOIST GIRDERS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. K-series open-web steel joists.
   2. LH-series long span steel joists.
   3. Joist girders.
   4. Joist accessories.

B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

C. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 01 4100, "Testing and Inspection Services - General": Independent testing agency procedures and administrative requirements.
   2. Section 03 3000," Concrete": Installing anchors set in concrete.
   3. Section 04 2000, "Unit Masonry": Installing anchors set in unit masonry.
   4. Section 05 1200, "Structural Steel": Field quality-control procedures .
   5. Section 03 4100, Structural Precast Concrete Wall Panels.
   6. Section 05 5000, "Metal Fabrications": Loose, steel bearing plates and miscellaneous steel framing.
   7. Section 09 9000, "Painting": Surface preparation and prime painting.

1.2 PERFORMANCE REQUIREMENTS:

A. Structural Performance: Engineer, fabricate, and erect joists and connections to withstand design loads within limits and under conditions required.
   1. Design Loads: As indicated.
   2. Design joists to withstand design loads without deflections greater than the following:
      a. Roof Joists: Vertical deflection of 1/360 of the span.

B. Engineering Responsibility: Engage a joist manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

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 type of joist, accessory, and product specified.

C. Shop Drawings showing layout, mark, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, accessories, splice and connection details, and attachment to other units of Work.
   1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
   2. For joists indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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 and joist girders with cantilevers or concentrated loads or joist sizes for which standard load tables are not applicable.

E. Material certificates signed by joist manufacturer certifying that joists comply with SJI's "Specifications."

F. Mill certificates signed by manufacturers of bolts certifying that their products comply with specified requirements.

G. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

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.
I. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence joists' compliance with building code in effect for Project.

1.4 QUALITY ASSURANCE:

A. Manufacturer Qualifications: Engage a firm experienced in manufacturing joists similar to those indicated for this Project and that have a record of successful in-service performance.
   1. Manufacturer must be certified by SJI to manufacture joists conforming to SJI standard specifications and load tables.
B. SJI Design Standard: Comply with recommendations of SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders," applicable to types of joists indicated.
C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
   1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the 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 joists that are similar to those indicated for this Project in material, design, and extent.
E. Inspection: Inspect joists and girders in accordance with SJI "Specifications."

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.6 SEQUENCING:

A. Deliver steel bearing plates and other devices to be built into concrete and masonry construction.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Steel: Comply with requirements of SJI's "Specifications" for chord and web section material.
B. Steel Bearing Plates: ASTM A 36 (ASTM A 36M).
C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
   1. Finish:
      a. Plain, noncoated.
D. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish:
      a. Plain, noncoated.
E. Welding Electrodes: Comply with AWS standards.

2.2 PRIMERS:

A. Steel Prime Paint: Manufacturer’s standard.

2.3 STEEL JOISTS:

A. Manufacture joists according to SJI's "Specifications," with steel angle top and bottom chord members, of joist types, end arrangements, and top chord arrangements indicated.
B. Manufacture joists according to SJI's "Specifications," with steel angle top and bottom chord members, and as follows:
   1. Joist Type:

a. K-series steel joists.
b. LH-series steel joists.
2. End Arrangement:
a. Underslung.
b. Underslung with bottom chord extensions.
3. Top Chord Arrangement:
a. Parallel.
b. Top chord single pitched

C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
D. 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.
E. Extend top chords of joists with SJI Type S top chord extensions where indicated, complying with SJI's "Specifications" and load tables.
F. Extend bearing ends of joists with SJI Type R extended ends where indicated, complying with SJI's "Specifications" and load tables.
G. Camber K-series steel joists according to SJI's "Specifications."
H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes when joist slope exceeds 1/4 inch in 12 inches (1:48).

2.4 JOIST ACCESSORIES:

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.
1. Supply additional bridging to ensure stability of structure during construction period.
B. Fabricate steel bearing plates with integral anchorage's as indicated and finish as follows:
1. Finish: Shop prime paint.
C. Steel bearing plates with integral anchorages are specified in Section 05500, "Metal Fabrications."
D. Supply miscellaneous accessories, including splice plates and bolts required by the joist manufacturer to complete the joist installation.

2.5 SHOP PAINTING:

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed as follows:
1. Surface Preparation:
a. Either hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
B. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film thickness of not less than 1 mil (0.025 mm).

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of joists. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. Do not install joists until supporting construction is in place and secured.
B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's recommendations, and the requirements of this Section.
C. Before installation, splice joists delivered to Project site in more than one piece.
D. Space, adjust, and align joists accurately in location before permanently fastening.
E. Install temporary bracing and bridging, connections, and anchors to ensure joists are stabilized during construction.

F. Anchors: Furnish anchor bolts, steel bearing plates, and other devices to be built into concrete masonry construction.
G. Provide unfinished threaded fasteners for anchor bolts, unless high strength bolts indicated.
H. Field weld joists to supporting steel framework and steel bearing plates. Coordinate welding sequence and procedure with placing of joists.
I. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
J. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.
K. Comply with the Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
L. Comply with the Research Council on Structural Connections' (RCSC) "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
M. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

3.3 FIELD QUALITY CONTROL:

A. Testing Laboratory Responsibility: The Owner's Testing Laboratory will perform field special inspections and tests on and to prepare test reports as follows:
   1. Testing Laboratory shall also approve welding certificates. Contractor shall submit three (3) copies of welding certificates and procedures for each welder involved in the Work.
   2. Testing Laboratory shall conduct and interpret tests, certificates and procedures and state in each report whether tested Work complies with or deviates from requirements.
B. Testing and verification procedures will be required of high-strength bolted connections and field welds per Special Inspection requirements per 2012 IBC. Refer to Special Inspection Schedule in Construction Documents.
C. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
D. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.2 REPAIRS AND PROTECTION:

A. Touch Up Painting: Following installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, accessories, bearing plates, and abutting structural steel.
   1. Clean and prepare surfaces by hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
   2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at the time of Substantial Completion.

END OF STEEL JOISTS AND JOIST GIRDERS

SECTION 05 3100

STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Steel roof deck.

B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 05 1200, "Structural Steel": Shop-welded shear connectors.
2. Section 05 5000, "Metal Fabrications": Framing openings with miscellaneous steel shapes.
3. Section 05 2100, “Steel Joists”.
4. Section 07 8150, "Sprayed-On Fireproofing".
5. Section 09 9000, "Painting":
   a. Touch-up and repair painting of deck.
   b. Touch-up and repair of special deck coatings.

1.2 SUBMITTALS:

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Submit all shop drawings on one reproducible print (sepia) and one blue line print only. The reproducible print will be returned. All blue line prints required by the Contractor will be the responsibility of the Contractor and shall be made after reproducible is returned.

C. Product data for each type of deck, accessory, and product specified.

1. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.

D. Shop drawings showing layout and types of deck panels, anchorage details, reinforcing channels, pans, cut openings, closure strips, deck openings, special jointing, accessories, and attachments to other construction.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

F. Product test reports from qualified independent testing agencies evidencing compliance with requirements of the following based on comprehensive testing:

1. Mechanical fasteners.

G. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence steel deck's compliance with the building code in effect for the Project.

1.3 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 (AISC), “Specification for the Design of Cold-Formed Steel Structural Members”.
2. American Welding Society (AWS), D1.3 “Structural Welding Code - Sheet Steel”.
3. Steel Deck Institute (SDI), ‘’Design Manual for Composite Decks, Form Decks and Roof Decks’’.

B. Installer Qualifications: Engage an experienced Installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel" and AWS D1.3 "Structural Welding Code-Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

E. Fire-Test-Response Characteristics: Where indicated, provide steel deck panels identical to those tested as part of an assembly for fire resistance per ASTM E 119 by a testing and inspection agency performing testing and follow-up services, that is acceptable to authorities having jurisdiction.

F. Fire-Resistance Ratings: As indicated by design designations listed in UL "Fire Resistance Directory," or by Warnock Hersey or another testing and inspecting agency.

G. Labeling: Identify steel deck with appropriate markings of applicable testing and inspecting agency.

H. Installation Tolerances: Conform to the installation tolerances specified in Part 3.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1.5 COORDINATION:

A. Coordinate installation of sound-absorbing insulation strips in acoustic deck ribs with related units of Work specified in other Sections to ensure that the insulation is protected against damage from effects of the weather and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Roof Deck:
   a. Vulcraft Div. of Nucor Corp.
   b. New Millennium Building Systems.
   c. Epic Metals Corp.
   d. Bowman Metal Deck Armco, Inc.
   e. Wiremold/Walker.
   f. Wheeling Corrugating Co., Div. of Wheeling-Pittsburgh Steel Corp.

2.2 ROOF DECK:

A. Steel Roof Deck: Fabricate panels without top-flange stiffening grooves conforming to SDI Publication No. 28 "Specifications and Commentary for Steel Roof Deck" and the following:

1. Galvanized-Steel Sheet: ASTM A 446, Grade A, G 60 (ASTM A 446M, Grade A, Z 180) zinc coated according to ASTM A 525 (ASTM A 525M).
2. Deck Profile:
   a. Type WR, wide rib. Vented deck at light gauge roof trusses.
3. Profile Depth:
   a. 1-1/2 inches.
4. Design Uncoated-Steel Thickness:
   a. 0.0358 inch.
5. Span Condition:
   a. Triple span or more.
6. Side Joints:
   a. Overlapped or interlocking seam at Contractor's option.

2.3 FABRICATION AND ACCESSORIES:

A. General: Form deck units in lengths of three or more spans, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, unless noted. End laps shall occur over a support.

B. Roof Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck".

C. Cant Strips: Fabricate cant strips of not less than 20 gage galvanized sheet steel of same quality as the deck units. Bend cant strips to form a 45 degree cant not less than 5 inches wide with top and bottom flanges not less than 2 inches wide, unless noted. Provide cant strips in 10 foot lengths where possible.

D. Ridge and Valley Plates: Fabricate ridge and valley plates of not less than 20 gage galvanized sheet steel of the same quality as deck units. Bend to provide tight-fitting closure with deck units. Each leg of bend shall not be less than 3 inches. Provide plates in 10 foot lengths where possible.

E. Accessories: Provide accessory materials for steel deck that comply with requirements indicated and recommendations of the steel deck manufacturer.

F. Mechanical Fasteners: Manufacturer's standard, corrosion-resistant, low-velocity, powder-actuated or pneumatically driven carbon steel fasteners; or self-drilling, self-threading screws.

G. Side Lap Fasteners: Manufacturer's standard, corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 10 (4.8 mm) minimum diameter.

H. Rib Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

I. Miscellaneous Roof Deck Accessories: Steel sheet, 0.0359-inch (0.91-mm) thick minimum ridge and valley plates, finish strips, and reinforcing channels, of same material as roof deck.

J. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material and thickness as deck panels, unless otherwise indicated.

K. Weld Washers: Manufacturer's standard uncoated-steel sheet weld washers, shaped to fit deck rib, 0.0598 inch (1.5 mm) thick with 3/8-inch (9.5-mm) minimum diameter prepunched hole.

L. Recessed Sump Pans: Manufacturer's standard size, single piece steel sheet 0.071-inch- (1.8-mm-) thick minimum, of same material as deck panels, with 1-1/2-inch- (38-mm-) minimum deep level recessed pans and 3-inch- (76-mm-) wide flanges. Cut holes for drains in the field.

M. Flat Receiver Pan: Manufacturer's standard size, single-piece steel sheet, 0.071-inch- (1.8-mm-) thick minimum units, of same material as deck panels. Cut holes for drains in the field.

N. Shear Connectors: ASTM A 108, Grade 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B.

O. Steel Sheet Accessories: ASTM A 446, G 60 (ASTM A 446M, Z 180) coating class, galvanized according to ASTM A 525 (ASTM A 525M).

P. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

3.2 PREPARATION:

A. Do not place deck panels on concrete supporting structure until concrete has cured and is dry.

B. Locate decking bundles to prevent overloading of supporting members.

3.3 INSTALLATION, GENERAL:

A. Install deck panels and accessories according to applicable specifications and commentary of SDI Publication No. 28, manufacturer's recommendations, and requirements of this Section.

B. Install temporary shoring before placing deck panels when required to meet deflection limitations.

C. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.

1. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
2. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
3. Do not use deck units for storage or working platforms until permanently secured.
4. Place deck panels flat and square and fasten to supporting framing without warp or deflection.
5. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to the decking.
6. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
7. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
8. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's instructions.

D. Deck Edge Tolerances: Perimeter deck edges shall be within =/- 1/2 inch of the indicated lines.

3.4 ROOF DECK INSTALLATION:

A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches (38 mm) long, and as follows:

1. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
2. Weld Diameter:
   a. 5/8 inch (16 mm), nominal.
3. Weld Spacing: Space and locate welds as indicated.
4. Weld Washers: Install weld washers at each weld location.
5. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 36 inches (910 mm), using one of the following methods:
   a. Mechanically fasten with self-drilling No. 10- (4.8-mm-) diameter or larger carbon steel screws.

B. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints:
   a. Lapped 2 inches (51 mm) minimum.

C. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 45 psf at eave overhang and 30 psf for other roof areas.

D. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking, and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least one weld at each corner.

F. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's recommendations. Weld to substrate to provide a complete deck installation.

3.5 FIELD QUALITY CONTROL:

A. Testing Agency: A qualified independent testing agency employed and paid Owner will perform field quality-control testing.

1. Field welds will be subject to inspection.

B. Testing Agency will report test results promptly and in writing to Contractor and Architect.

C. Remove and replace work that does not comply with specified requirements.

D. Additional testing will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION:

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.

END OF STEEL DECK

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formed galvanized steel stud for framing, load-bearing exterior wall and load-bearing interior walls, related assemblies, and other locations as indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract including Supplementary Conditions and Division 01 Specification Sections apply to the Section.

B. Section 01 4100 - Quality Requirements: Mock-up requirements.

C. Section 04 2000 - Unit Masonry: Brick veneer supported by wall stud metal framing.

D. Section 05 1200 - Structural Steel: Steel framing supporting wall stud metal framing.

E. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.

F. Section 07 2100 - Thermal Insulation: Insulation within framing members.

G. Section 07 9200 - Joint Sealants.

H. Section 09 2116 - Gypsum Board Assemblies: Lightweight, non-load bearing metal stud framing and gypsum board, backer board, and exterior sheathing.

I. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

F. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2024.

G. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).

H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

J. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

K. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation,

firestopping, sheathing and drywall, devices to be installed within the wall cavity, blocking for items to be installed on the wall and supported by the structure via installed blocking.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.

C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

D. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
   1. Indicate stud and ceiling joist layout.
   2. Describe method for securing studs to tracks and for bolted framing connections.
   3. Design data:
      a. Shop drawings signed and sealed by a professional structural engineer registered in the State where the project is located.
      b. Calculations for loadings and stresses of specially fabricated framing, signed and sealed by a professional structural engineer rigistered in the State where the project is located.
      c. Details and calculations for factory-made framing connectors, signed and sealed by a professional structural engineer registered in the State where the project is located.

E. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

1.06 DESIGN REQUIREMENTS

A. Horizontal Deflection:
   1. At cold formed metal framed walls scheduled for cladding (at any height) with brick, stone, masonry, tile, stucco, or similar rigid (inflexible) wall veneers or finished: Maximum 1/600 of span unless indicated otherwise on Structural drawings.
   2. At cold formed metal framed walls scheduled for cladding (full height) with EIFS, metal panel, or similar flexible wall finishes: Maximum of 1/360 of span, unless indicated otherwise on Structural drawings.

B. Vertical Deflection:
   1. Design non-axial loadbearing framing to accommodate not less than 1/2" (13mm) vertical deflection, unless indicated otherwise on Structural drawings.

C. Design wall assembly to provide for movement of components without damage, failure of joint seals, undue stress of fasteners, or other detrimental effect when subject to seasonal or cyclical day/ night temperature ranges.

D. Design wall assembly to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings. Whether or not specifically indicated on the drawings, provide deflection type slip-track at top of all non-load bearing walls installed tight to underside of roof decks, floor structure, and/or framing supporting roof or floor structures.

E. Studs and runner tracks at all exterior walls and interior load-bearing walls (if any) shall be a minimum of 6" depth x 1 5/8" width (or greater where indicated or required), and shall be spaced a maximum of 16" o.c. (or less where indicated or required). Studs shall be manufacturer's standard "C" shape.

F. Structural channels, studs, joists, and other framing shall be as indicated on the Structural Drawings.

G. Provide continuous bridging channels (and/ or stud tracks as bridging channels) as indicated.

H. Frame structural headers at all openings.

I. Galvanized steel strap bracing shall be provided continuous at top and bottom runner tracks and at bridging locations at all curved walls.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum five years of documented experience.

C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start of scheduled welding work.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

E. Design structural elements under direct supervision of a Professional Structural Engineer experienced in the design of this work and licensed in the State where the project is located.

1.08 MOCK-UP

A. Integrate materials of this Section into the Exterior Assembly Mock-up per the drawing requirements, including insulation, sheathing, window frame, door frame, exterior wall finish, and interior wall finish.

B. Location: As directed.

C. Mock-up may not remain as part of the Work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Framing:
1. CEMCO: www.cemcosteel.com/#sle.
2. ClarkDietrich: www.clarkdietrich.com/#sle.
3. Marino: www.marinoware.com/#sle.
4. MBA Metal Framing: www.mbastuds.com.
5. SEMCO, Southeastern Metals, Division of Gibraltar Industries.
6. Steel-Con; Steel Construction Systems: www.steelconsystems.com/#sle.
7. The Steel Network, Inc: www.SteelNetwork.com/#sle.
8. Substitutions: See Section 01 6000 - Product Requirements.

B. Framing Connectors and Accessories:
1. Same manufacturer as metal framing.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

B. Design Requirements: Provide completed framing system having the following characteristics:
1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100.
2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
3. Design Loads: Design to most stringent requirement of applicable Codes and the requirements set forth on the drawings and elsewhere in these specifications. .

4. Live load deflection meeting the following, unless otherwise indicated:
   a. Exterior Walls: Maximum horizontal deflection under wind load of per Section 1.06 A.
   b. Design non-axial loadbearing framing to accommodate not less than 1/2 in vertical deflection.
5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 FRAMING MATERIALS

A. System Components: With each type of metal framing and headers required, provide manufacturer's standard steel runners (tracks), blocking, bridging, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.

B. Materials and Finished:
   1. For 16-gage and heavier units, fabricate metal framing components of structural quality steel (designated SS per ASTM A1008/ A1008M) with a minimum yield point of 50,000 psi; ASTM A446, A570, or A611.
   2. For 18-gage and lighter units, fabricate metal framing components of commercial quality sheet steel with a minimum yield point of 33,000 psi; ASTM A446, A570, or A611.
   3. Provide galvanized finish to metal framing components complying with ASTM A653/ A653M for minimum G90/ Z275 coating.
   4. Unless otherwise indicated, finish of all accessories shall match that of main framing components.

C. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
   1. Studs: Manufacturer's standard load-bearing steel studs of size, shape, and gage as indicated or required, with 1 5/8" flange and flange return lip.
      a. Gauge: As required to meet specified performance levels, but not less than that indicated on the drawings.
      b. Depth: As indicated on drawings.
   2. Tracks: Unless otherwise indicated or required by project conditions, fire-ratings, etc., provide manufacturer's standard Deep Leg Tracks, unpunched unless otherwise indicated, of size, shape and gauge indicated, with 1 5/16" flange.
      a. Gauge: As required to meet specified performance levels, but not less than that indicated on the drawings.
      b. Depth: As indicated on drawings.
      c. Deflection Track: Required, whether indicated on drawings or not, at all full height stud walls installed tight to floor deck, roof deck, or structure supporting floor or roof decks. Vertical slip tracks shall permit minimum 1/2" vertical movement.
         1) Products: ClarkDietrich Double Track System: Track-over-Track System, SLP-TRK Slotted Track System, or TR-Series with Spazzer 9200 Bar (SPZD), or equivalent manufactured by the primary framing manufacturer.
         2) Substitutions: See Section 01 6000 - Product Requirements.
      d. Curved Walls and Arches: Provide tracks designed for curved walls and arches where required.
         1) Special Stud Tracks for Curved Walls: "Flex-C Trac" as manufactured by Flex-Ability Concepts, Inc. (www.flexabilityconcepts.com), or equivalent.
         2) Special Stud Tracks at Arched Openings: "Flex-C Arch" as manufactured by Flex-Ability Concepts, Inc. (www.flexabilityconcepts.com), or equivalent.

3) Substitutions: See Section 01 6000 - Product Requirements.

3. Jamb Studs: Engineered, C-shaped with wide flanges, designed to replace conventional double-stud framing at openings.

D. Header: Engineered one-member or two-member assembly, with wide flanges, designed to replace conventional box or nested header framing at openings.

E. Clips:
1. Jamb Mounting Clips: Manufacturer's standard for specific condition.
2. Cripple Stud Clips: Manufacturer's standard for specific condition.

F. Framing Connectors: Factory-made, formed steel sheet.
1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gauge, 0.1345 inch, and factory punched holes and slots.
2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100.
3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings and where otherwise required .
a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
c. Products:
1) ClarkDietrich; Drift FastClip Slide Clip D-FCSC: www.clarkdietrich.com/#sle.
2) ClarkDietrich; FastClip Slide Clip FCSC: www.clarkdietrich.com/#sle.
3) MBA Building Supplies; Slotted Track: www.mbastuds.com/#sle.
4) Simpson Strong-Tie; SCB Side-Clip Connector: www.strongtie.com/#sle.
5) Super Stud Building Products, Inc; Deflection Clips: www.buysuperstud.com/#sle.
6) Substitutions: See Section 01 6000 - Product Requirements.
4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
a. Products:
1) Simpson Strong-Tie; RCKW Kneewall Connector: www.strongtie.com/#sle.
2) Substitutions: See Section 01 6000 - Product Requirements.
5. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections where indicated on the drawings.
a. Products:
1) ClarkDietrich; Spazzer 5400 Bridging Bar: www.clarkdietrich.com/#sle.
2) ClarkDietrich; FastBridge Clip: www.clarkdietrich.com/#sle.
3) Simpson Strong-Tie; SUBH Bridging Connector: www.strongtie.com/#sle.
4) Substitutions: See Section 01 6000 - Product Requirements.
6. Factory Fabricated Shear Wall Panels:
a. Furnish and install factory fabricated shear wall panels where indicated on the drawings and where required for framing system to comply with specified loading requirements.
b. Products:

1) CEMCO; Sure-Board Series 200: www.cemcosteel.com/#sle.
2) Substitutions: See Section 01 6000 - Product Requirements.

2.04 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Anchorage Devices: Powder actuated.

C. Welding: Comply with AWS D1.1/D1.1M.

2.05 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify field measurements are consistent with the shop drawings. Where adjustments to the installation are required due to field dimensions, notify the Architect in writing prior to proceeding.

C. Coordinate the work of this Section with the installation of non-load bearing framing specified in Section 09 2116 - Gypsum Board Assemblies.

3.02 DELIVERY, STORAGE AND HANDLING

A. Protect metal framing materials from rust and damage. Deliver to project site in manufacturer's un-opened containers or bundles, fully identified by brand, name, type, and grade. Store off ground in a dry ventilated space or protect with breathable waterproof tarpaulins.

3.03 INSTALLATION OF STUDS

A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.

B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.

C. Place studs at 12 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.

D. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

E. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.

F. Install load-bearing studs, brace, and reinforce to develop full strength and achieve design requirements.

G. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

H. Install intermediate studs above and below openings to align with wall stud spacing.

I. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

J. Attach cross studs to studs for attachment of fixtures anchored to walls.

K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

L. Touch-up field welds and damaged galvanized surfaces with primer.

3.04 FIELD QUALITY CONTROL

A. The work of this section is subject to field inspections to be performed by the Special Inspection Agency. See Section 01 4533 - Code Required Special Inspections and the Special Inspections instructions on the Structural drawings for requirements.

3.05 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized stud coating on installed cold formed framing with galvanizing repair paint in accordance with ASTM A780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions in a mnaaer acceptable to manufacturer and installer to ensure framing and components remain without damage or deterioration at time of Substantial Completion.

3.06 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Variation of any Member from Plane: 1/16 inch.

END OF SECTION

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SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

B. Downspout boots.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

C. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

D. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.

E. Section 05 2100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.

F. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

G. Section 05 5100 - Metal Stairs.

H. Section 09 9000 - Painting: Paint finish where applicable.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.

B. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2024.

C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

F. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

H. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

M. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

N. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

O. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

P. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

Q. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

R. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
      a. Include the following, as applicable:
         1) Design criteria.
         2) Engineering analysis depicting stresses and deflections.
         3) Member sizes and gauges.
         4) Details of connections.
         5) Support reactions.
         6) Bracing requirements.
   3. Shop drawings for components that must comply with specific Code required loading (i.e. handrails, stairs, ladders and guardrails) shall bear the seal of a registered Structural Engineer.

1.05 QUALITY ASSURANCE

A. Design work of this section under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Stainless Steel, General: ASTM A666/A666M, Type 304.

F. Stainless Steel Tubing: ASTM A554, Type 304, 16 gauge, 0.0625 inch minimum metal thickness, 1-1/2 inch diameter.

G. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

H. Slotted Channel Fittings: ASTM A1011/A1011M.

I. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

J. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

K. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

M. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

N. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 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. Continuously seal joined members by intermittent welds and plastic filler.

D. 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.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.

B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; galvanized finish.

C. Lintels: As detailed; galvanized finish.

D. Door Frames for Overhead Door Openings: Channel and plate sections as detailed; galvanized finish.

2.04 DOWNSPOUT BOOTS

A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and on-body cleanout and cover with neoprene gaskets.
   1. Location: Whether indicated on the drawings or not, install cast iron downspout boots at all locations where downspouts discharge to asphalt or concrete paved surfaces. Cast iron downspout boots are not required at downspouts that are integral components of aluminum canopy structures, and they are not required where downspouts discharge to landscaped areas.
   2. Configuration: Angular.
   3. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
   4. Finish: Manufacturer's standard factory applied powder coat finish.

5. Color: To be selected by Architect from manufacturer's standard range.
6. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.
7. Manufacturers:
   a. Downspoutboots.com, a division of J. R. Hoe & Sons; Angular downspout boot: www.downspoutboots.com/#sle.
   b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanized items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanized finish shall not be primed or painted.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 06 1000
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rough opening framing for doors, windows, and roof openings.

B. Roofing nailers.

C. Roofing cant strips.

D. Preservative treated wood materials.

E. Fire retardant treated wood materials.

F. Communications and electrical room mounting boards.

G. Concealed wood blocking, nailers, and supports.

H. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 05 1200 - Structural Steel Framing: Prefabricated beams and columns for support of wood framing.

C. Section 05 3100 - Steel Deck.

D. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings, and self-adhered membrane flashing over sheathing.

F. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing, light gage interior wall assemblies.

G. Division 26-28 - Electrical: Mounting Boards furnished and installed under the electrician's scope of work.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2023.

E. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. PS 1 - Structural Plywood; 2023.

G. PS 20 - American Softwood Lumber Standard; 2025.

H. SPIB (GR) - Standard Grading Rules; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

D. Submit data sheets and samples of all fasteners.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Southern Pine, unless otherwise indicated.
   2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. Northeastern Lumber Manufacturer's Association (NeLMA).
   2. National Lumber Grades Authority (NLGA).
   3. Redwood Inspection Service (RIS).
   4. Southern Pine Inspection Bureau (SPIB).
   5. West Coast Lumber Inspection Bureau (WCLIB).
   6. Western Wood Products Association (WWPA).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 EXPOSED BOARDS

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S4S.

D. Species: Southern Pine.

E. Grade: No. 2, 2 Common, or Construction.

F. Communications and Electrical Room Mounting Boards: UL verified fire retardant backboard: A-C plywood; 3/4 inch thick; Coated with UL Classified Fire Retardant Latex (Class "A" Rated).

Tested to UL723 (ASTM E84) standards. Color: As selected by Architect from manufacturer's standard colors.

1. Pre-Manufacturered Product:
    a. WoodBacker "Fire Retardant Backboards"; [Basis of Design]: www.woodbacker.com.
    b. Substitutions: See Section 01 6000 - Product Requirements.

G. Other Applications:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: AISI Type 304 or 316 Stainless steel for fire-retardant wood and preservative-treated wood locations; hot-dipped galvanized steel per ASTM A 153/ A 153M for rough carpentry exposed to weather, in ground contact, or area of high relative humidity; unfinished steel elsewhere. Acceptable to manufacturer of wood treatment materials and manufacturer of fasteners.
2. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Metal Framing Anchors:
1. General: Provide metal framing anchors of type, size, metal, and finish indicated that comply with requirements specified including the following:
    a. Current Evaluation/Research Reports: Provide products for which model code evaluation/research reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with the building code in effect for this Project.
    b. Allowable Design Loads: Provide products for which manufacturer publishes allowable design loads that are determined from empirical data or by rational engineering analysis and that are demonstrated by comprehnsive testing performed by a qualified independent testing laboratory.
2. Galvanized Steel Sheet: Steel sheet zinc-coated by hot-dip process on continuous lines prior to fabrication to comply with ASTM A 525 for Coating Designation G90 and with ASTM A 446, Grade A (structural quality); ASTM A 526 (commercial quality); or ASTM A 527 (lock-forming quality); as standard with manufacturer for type of anchor indicated.
    a. Use galvanized steel framing anchors for rough carpentry exposed to weather, in ground contact, or in area of high relative humidity, and all other locations, and at every point of bearing.
    b. Minimum Thickness: 18-gauge.

C. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

D. Panel Sheathing Clips: Provide panel sheathing clips in quantity and location recommended by manufacturer. For use for all unsupported edges. Simpson Stong-Tie Panel Sheathing Clips PSCA, 20 gauge, galvanized. Substitutions: Section 01 6000 - Product Requirements.

E. Nails, Wire, and Brads: FS FF-N-105.

F. Power Driven Fasteners (screws): National Evalution Report NER-272.

G. Wood Screws: ANSI B18.6.1.

H. Lag Bolts: ANSI B18.2.1.

I. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

J. Anchors shall be manufactured by American manufacturer.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:
   1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Do not use treated wood in direct contact with the ground.
   2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. All interior rough carpentry items in buildings of Type I or Type II construction are to be fire retardant treated.
      c. All concealed wood blocking, framing and sheathing in buildings of Type I or Type II construction shall be fire retardant treated.
      d. Review Life Safety Sheets and provide fire retardant treated wood blocking in all rated walls.
      e. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
   1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      a. Treat lumber exposed to weather.
   2. Treat lumber in contact with roofing, flashing, or waterproofing.
   3. Treat lumber in contact with masonry or concrete.
   4. Treat lumber less than 18 inches above grade.
      a. Treat lumber in other locations as indicated.
   5. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
      a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
      b. Treat plywood in contact with roofing, flashing, or waterproofing.
      c. Treat plywood in contact with masonry or concrete.
      d. Treat plywood less than 18 inches above grade.

e. Treat plywood in other locations as indicated.

D. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 - EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:
1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Chalkboards and marker boards.
8. Wall paneling and trim.
9. Joints of rigid wall coverings that occur between studs.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except _____ where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.
   4. Size and Location: As indicated on drawings.

3.06 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.07 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 5000.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Shop finishing.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 06 4000 - Architectural Woodwork: Wood frames, countertops, etc.

C. Section 08 1416 - Flush Wood Doors.

D. Section 09 9100 - Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.

D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide instructions for attachment hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.

D. Samples: Submit one sample of lumber or finish plywood, 12 by 12 inch in size, and two samples 3 by 3 inch in size, illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 6 inch long.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Premium grade.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.

B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.

C. Protect from moisture damage.

D. Handle materials and products to prevent damage to edges, ends, or surfaces.

1.08 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Quality Standards Illustrated for Premium Grade.

2.02 SUSTAINABILITY CHARACTERISTICS

2.03 LUMBER MATERIALS

A. Softwood Lumber: SYP species, maximum moisture content of 6 percentof quality suitable for transparent finish.
   1. Grading: In accordance with rules certified by ALSC; www.alsc.org.

B. Hardwood Lumber: white or yellow poplar species (coordinate with other wood trim), maximum moisture content of 6 percent.

2.04 SHEET MATERIALS

A. Softwood Plywood: PS 1 Grade A-B; Veneer core; SYP face species, (or similar species permitted by reference standards).

B. Hardwood Plywood: HPVA HP-1, Grade AA, Type I at exterior, Type II at Interior; Veneer core, type of glue recommended for application; Natural Birch face species, Rotary cut.

2.05 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, HGS See Finish Legend for manufacturer and color.

2.06 ADHESIVE

A. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.07 FASTENINGS

A. Fasteners: Of size and type to suit application; galvanized finish in concealed locations and stainless steel finish in exposed locations.

B. Concealed Joint Fasteners: Threaded steel.

2.08 ACCESSORIES

A. Lumber for Shimming, Blocking: Softwood lumber of SYP species.

B. Primer: Alkyd primer sealer.

C. Wood Filler: Solvent base, tinted to match surface finish color.

2.09 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Cap exposed plastic laminate finish edges with material of same finish and pattern.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

2.10 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Stain: As selected by Architect.
      c. Sheen: Flat.
   2. Opaque:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Color: As selected by Architect.
      c. Sheen: Flat.

E. Prime paint surfaces in contact with cementitious materials.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify wall surface is free of bows, humps, and other deficiencies that will be emphasized by the trim work. Report these issues to the Prime Contractor.

3.02 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Install interior trim with wall adhesive by gun application. Install exterior trim and components with hot-dipped galvanized or stainless steel nails at 12" o.c., unless recommended otherwise by manufacturer.

E. Match grains and color so that individual pieces do not stand out.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 9100 - Painting.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

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SECTION 06 4000
ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Laminate covered cabinets.

B. Wood cabinets, desks, and paneling.

C. Solid surface countertops, backsplashes and trim, where indicated; and vertical panels, where indicated.

D. Closet and utility shelving (paint on site, under Section 09 9100).

E. Wood frames, sidelights, panels, base, window sills, and miscellaneous trim (paint on site, under Section 09 9100), stained (transparent finish) or painted (opaque finish) where indicated.

F. Hardware for architectural woodwork.

G. Related work and trim for above items.

H. Extent of each type of architectural woodwork is indicated on drawings and in schedules.

I. Architectural woodwork and components for opaque finish are intended to be finish painted on-site, under Section 09 9100.

J. Architectural woodwork and components for natural, stained and/or transparent finish are intended to be painted in woodwork fabricator's shop under controlled conditions, under the work of this Section.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Related work specified elsewhere includes:
   1. Section 06 1000 - Rough Carpentry.
   2. Section 06 2000 - Finish Carpentry.
   3. Section 07 9005 - Joint Sealers.
   4. Section 08 1416 - Flush Wood Doors.
   5. Section 09 9100 - Painting.
   6. Section 12 3219 - Laminate Casework.

1.03 SUBMITTALS:

A. Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, attachment devices, blocking requirements and other components.
   1. Manufacturer's current and complete product data, for manufactured units of work, including color selection data, samples, and anchorage systems.

B. Samples: Submit the following samples:
   1. Lumber and panel products with or for transparent finish; 6-inches x 3/4-inch x 18-inches, for each species and cut, finished on 1-side and 1-edge. Also submit two 3 by 3 inch samples with finish on 1-side.
   2. Cabinet Hardware: One unit of each type and finish, which will be returned for use on the project, upon request by the Contractor.
   3. Solid Surfacing and Plastic Laminate Products: Manufacturer's standard samples, approximately 4-inches x 6-inches, with finish as required for this project, and representative color range anticipated.

1.04 QUALITY ASSURANCE:

A. AWS: Comply with applicable requirements of "Architectural Woodwork Standards" published by the Architectural Woodwork Standards, 2nd Edition, October, 2014.

B. Fabricator Qualifications: Fabricators shall be experienced firms specializing in the types of architectural woodwork required for this project for at least 5-verifiable years and on at least 10-verifiable projects of similar size, scope, complexity, and quality as this project.
   1. Solid Surfacing Fabricator: 5-years and 10-verifiable projects.

C. Installer Qualifications: Arrange for installation of architectural woodwork by the fabricator, or by a firm under the control and direction of the fabricator, which can demonstrate at least 5-verifiable years successful experience in installing architectural woodwork items on at least 5-verifiable projects, similar in type and quality to those required for this project.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver woodwork, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.06 PROJECT CONDITIONS:

A. Conditioning: Woodwork Manufacturer and Installer shall advise Contractor of temperature and humidity requirements for woodwork installation and storage areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

B. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0-percent tolerance of optimum moisture content, from date of installation through remainder of construction period. Require Woodwork Manufacturer to establish optimum moisture content and required temperature and humidity conditions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Laminate Clad and Wood Cabinet Manufacturers: Subject to compliance with requirements, provide premium grade, custom made cabinets and woodwork from a millwork shop complying with requirements of "Quality Assurance" article above.

B. Plastic Laminate Manufacturer: See Finish Legend for Manufacturers and colors.

C. Solid-Surfacing Material/Manufacturer: Homogeneous solid sheets of cast, filled acrylic resin complying with material and performance requirements in ANSI Z124.3, for Type 6.
   1. Standard full product line of "Corian" (Basis of Design, Quality and Warranty) as manufactured by DuPont.
   2. Hi Macs: www.lghimacs.com.
   3. Wilsonart: www.wilsonart.com.
   4. See Finish Legend for Manufacturers and colors.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FABRICATION, GENERAL:

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated with dowel, dado, glue and screw construction, with openings and mortises precut, where possible, to receive hardware and other items and work.
   1. Ease edges to a 1/16-inch radius, for corners of cabinets and edges of solid wood (lumber) members less than 1-inch in nominal thickness, 1/8-inch radius for edges of rails and similar members over 1-inch in nominal thickness.

C. Complete fabrication, assembly, hardware application, and other work before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Pre-Cut Openings: Fabricate architectural woodwork with pre-cut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.

E. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit. A tight fit of less than 1/8-inch is expected.

F. Products in this Section shall be constructed only of materials that are formaldehyde-free.

2.03 FIRE-RETARDANT MATERIALS:

A. Where fire-retardant treated lumber is indicated, provide materials which are pressure impregnated with fire-retardant chemicals and comply with the following requirements:
   1. As required to comply with referenced standards and finish classifications necessary as per the Standard Building Code, NFPA 101 - Life Safety Code, authorities having jurisdiction, and acceptable in all respects for indoor use and finish requirements.
   2. Fire-Retardant Chemicals: Use chemicals of type and for applications indicated which do not bleed-through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated lumber from untreated lumber.

B. Fire Performance Characteristics: Provide materials which are identical to those tested per ASTM methods and time periods indicated, are marked and listed for fire performance characteristics by Underwriters Laboratories, Inc., or other testing and inspecting agency acceptable to authorities having jurisdiction, and comply with the following requirements:
   1. Mill lumber after treatment, within limits set for wood removal which does not affect listed fire performance characteristics, using a woodworking plant certified by testing and inspecting agency.

C. Marking: Identify treated lumber with separable paper classification marking of inspecting and testing agency, unless otherwise indicated.

D. Surface Burning Characteristics: Not exceeding values required by latest edition of the "Standard Building Code" and "NFPA 101" (with amendments), tested per ASTM E 84 for standard time period.
   1. Flame Spread: Per Code.
   2. Smoke Developed: Per Code.

E. Kiln-dry woodwork after treatment to levels required for non-fire-retardant treated woodwork materials. Maintain moisture content required by kiln drying, before and after treatment.
   1. Discard treated lumber which does not comply with requirements of referenced woodworking standard. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective lumber.

2.04 STANDING AND RUNNING TRIM:

A. Quality Standard: Comply with AWS Section 6 - Interior Millwork.

B. Rout or groove backs of flat trim members, kerf backs of other wide flat members, except for members with ends exposed in finished work.

C. Assemble Casings in plant except where limitations of access to place of installation require field assembly.

D. Interior Trim for Transparent Finish (typical finish unless specifically indicated otherwise): Comply with the following requirements:
   1. Grade: Premium, Grade I.
   2. Lumber Species: Match wood doors.
   3. Cut: Plain Sliced.
   4. Locations: Provide stained transparent finish within rooms which have new woodwork with transparent finish, at indicated areas. Refer to Elevations.

E. Interior Trim for Opaque Finish (only where specifically indicated, if any): Comply with the following requirements:
   1. Grade: Custom. Grade II.
   2. Lumber Species: Any closed-grain hardwood listed in referenced woodworking standard.
   3. Cut: Plain or Rotary cut.
   4. Locations: Provide opaque finish within rooms which have new woodwork with opaque finish, unless indicated otherwise. Refer to Elevations and Finish Legend.

2.05 ARCHITECTURAL COUNTER TOPS:

A. Quality Standard: Comply with AWS, Edition 1 - Section 11-Countertops.

B. Types of Top (and/or panel): Solid Surfacing.
   1. Colors, Patterns and Finishes: As indicated, or if not indicated, as selected from any of manufacturer's standard finishes and colors.
   2. Edge Treatment: As indicated on the Drawings.
   3. Thickness - Tops and Substrates:
      a. Tops (and any flat vertical panels): 3/4-inch, with 1-1/4-inch built-up edges unless indicated otherwise on the Drawings.
      b. Backsplash: 1/2-inch.
      c. Edge Treatment: As indicated on the Drawings, or if not indicated, ease all exposed edges to 1/16" radius, and seam width of less than 1/8".
         1) DuPont-approved adhesive to create color-matched seam.
      d. Substrates: Refer to the Drawings for thickness of plywood below solid surface tops, splashes, etc., or if not indicated, at least 3/4-inch thick at horizontal and sloped surfaces (and at least 1/2-inch thick at any vertical panels).
   4. Allowable tolerances:
      a. Flat and true to within 1/8" of a flat surface over a 10' length.
      b. Allow a minimum of 1/16" to a maximum of 1/8" clearance between surface and each wall.
      c. Variation in Component Size: 1/8" over a 10' length.
      d. Location of Openngs: 1/8" from indicated location.
   5. Provide manufacturer's 10-year warranty against defects in materials.
      a. Warranty shall provide material to repair or replace defective materials.
      b. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
      c. The above warranty shall be in addition to, shall be in effect simultaneously with, and shall not limit or alter other project or product warranties or guarantees, nor shall it serve as limitation to other remedies available to the Owner.

2.06 FINISHING OF INTERIOR ARCHITECTURAL WOODWORK:

A. Quality Standard: Comply with AWS Section 5, unless otherwise indicated.

B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing of concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.

C. Interiors for wood cabinets: To match wood veneer.

D. Melamine cladded interiors for wood cabinets: To match HPDL.

2.07 ARCHITECTURAL LAMINATE CLAD CABINETS:

A. Quality Standard:
   1. Comply with AWS Section 10.
   2. Grade: Premium.
   3. Design: Flush overlay - Type A- Frameless construction.

B. Laminate Cladding: High pressure decorative laminate complying with NEMA LD 3 and as follows:
   1. Colors, Patterns and Finishes: As indicated or, if not otherwise indicated, as selected by Architect from laminate manufacturers' standard products in the following categories: Solid, stippled, textured, wood grain and/or patterned colors; Thru-color type.
   2. Provide specific types as scheduled.
      a. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
      b. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
      c. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
      d. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
      e. Flame Retardant Surfaces: HGF, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
      f. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
      g. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

C. Hardboard: AHA A135.4 (tempered).

D. Melamine cladded interiors in laminate cabinets.

E. Core Materials:
   1. MR Moisture Resistant Medium Density Fiberboard: Average 47-pound density grade, ANSI A208.2.

2.08 INTERIOR FRAMES AND JAMBS

A. Quality Standard: Comply with AWS Section 10.
   1. Grade: Premium.

B. Wood Species:
   1. For Opaque Finish: Any closed-grain hardwood listed in referenced woodworking standard.
   2. For Transparent Finish (stained): Match wood doors.

C. Fire Rated Frames:
   1. 20 min and 45 min rated types. Refer to Door Schedule.

D. Jamb Type: Flat jamb, unless indicated otherwise.

2.09 CLOSET AND UTILITY SHELVING:

A. Plastic laminate shelving where indicated.

B. Quality Standard: Comply with AWS Section 6.

C. Shelving for Opaque Finish: Comply with the following requirements:
   1. Grade: Custom.
   2. Shelving Material: Birch faced veneer core plywood.
   3. Exposed Edging: Solid hardwood.
   4. Thickness: 1-inch at wood shelves, unless indicated otherwise

D. Shelving for Transparent Finish: Comply with the following requirements:
   1. Location: Only in rooms where specifically indicated on Drawings.
   2. Grade: Custom.
   3. Species: AWS Veneer Grade A, Select Red Oak, or White or Yellow Poplar, Rotary Cut (unless scheduled otherwise).
   4. Thickness (plywood): 1-inch (minimum), with solid wood nosing.
   5. Lumber for shelving, only where indicated on the Drawings: 5/4-inch with nosings as indicated.

2.10 FASTENERS AND ANCHORS:

A. Screws: Select material, type, size and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

B. Nails: Select material, type, size and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

C. Anchors: Select material, type, size and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot- dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion-resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

2.11 CABINET HARDWARE AND ACCESSORY MATERIALS:

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items which are specified in Section 08 7100 - Finish Hardware.

B. Hardware Standard: Comply with ANSI/BHMA A156.9 "American National Standard for Cabinet Hardware" for items indicated by reference to BHMA numbers or referenced to this standard.

C. Hardware Finishes: Comply with BHMA 1301 for finishes indicated by BHMA Code Numbers or if not otherwise indicated, provide finishes complying with requirements indicated.
   1. For exposed hardware comply with requirements indicated for finish and base indicated at the end of this Section.
   2. For concealed hardware provide manufacturer's standard finishes which comply with product class requirements of ANSI/BHMA A156.9, and which match exposed hardware on same cabinet unit.

2.12 SHELVING SUPPORTS AND RODS

A. Wall Mounted Brackets and Standards:
   1. Adjustable, double slotted, extra-heavy duty:
      a. Equivalent to K&V No. 85/185 Series Extra Duty Standards & Brackets.
         1) Standards: 1-1/4" wide x 1/2" deep x length indicated. 16 ga. steel. Finish & Color: TBS.

2) Brackets: Vertically adjustable in 1" increments. 14 ga. & 16 ga. steel. Finish & Color: TBS.

2. Clothes Rods:
   a. Closet Hanger Rod and Support:
      1) Rod: Equivalent to K&V No. 770-1. Extra-Duty. Steel. Chrome double-plated finish. Provide with end caps.
      2) Flanges: Equivalent to K&V No. 734 and No. 735, two (2) each per rod. Zinc cast. Finish: Match rod.
      3) Supports: Fixed closet rod and shelf brackets. Extra-Duty. Equivalent to K&V No. 1198. 10 ga. steel construction. Finish & Color: TBS.

B. Pilaster Standards and Supports: Provide adjustable shelf standards and related supports of type indicated, with matching finish on fasteners and accessories.
   1. Vertical Slotted Standard:
      a. Mortise mounted, 5/8-inch wide x 3/16-inch deep x length indicated; high strength steel.
      b. Equivalent to K&V No. 255, Finish & Color: TBS.
   2. Shelf Support:
      a. Shelf support clip; High strength steel.
      b. Equivalent to K&V No. 256, Finish & Color: TBS.

2.13 COUNTERTOP SUPPORT

A. Countertop support brackets, undercounter support frames, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and epoxy powder painted. Color shall be as selected by Architect from manufacturer's standard colors.
   1. Support brackets shall be equal to Rakks EH Counter Support Bracket unless otherwise noted.
      a. For concealed support, provide Inside Wall Flush-Mount bracket.

2.14 CABINET HARDWARE

A. Cabinet Hinges: 170-degrees adjustable "CLIP System" concealed self-closing hinges as manufactured by Julius Blum, Inc., or equivalent by Grass or Stanley.
   1. Finish shall match hardware finish specified in Section 08 7100 - Finish Hardware in room(s) where occurs.
   2. Location: Administration, Ranger Room, and Conference.

B. Cabinet Hinges: Equivalent to 5-knuckle exposed self-closing hinges as manufactured by Julius Blum, Inc., Grass or Stanley.
   1. Finish shall match hardware finish specified in Section 08 7100 - "Finish Hardware" in room(s) where occurs.
   2. Location: Classrooms and all other areas not noted above.

C. Cabinet Door and Drawer Pulls:
   1. Wire pulls, equivalent to Stanley No. 4484, (ANSI B12012), 4-inches long, with 1-inch clearance; unless indicated otherwise. Pull design shall comply with the Americans with Disability Act (ADA).
      a. Finish shall match hardware finish specified in Section 08 7100 - Finish Hardware.

D. Cabinet Door Catches: Manufacturer's standard 2-screw sill mounted unit made of molded nylon, lipped over sill to form bumper and hold in place, with 2-screw mounted heavy door mounted unit with nylon roller; provide spring-mounted units where required.
   1. Acceptable Manufacturers: Any of manufacturers listed for other cabinet hardware.

E. Cabinet Drawer Slides: Heavy Duty, non-corrosive (galvanized) full extension ball bearing slides rated at 100-pounds, with positive stop, and self-closing and lift-out disconnect features; Model No. 1429, as manufactured by Knape & Vogt, or equivalent by Blum or Grant.
   1. At legal size drawers, use K&V No. 1483 or equivalent, rated at 150-pounds, with same features as noted above.

F. Cabinet Shelf Standards: Manufacturer's standard steel units with anchors and supports 5/8-inch wide x 3/16-inch high, adjustable on 1/2-inch centers; Series 255, as manufactured by K&V, or equivalent by Grant or Stanley.
   1. Wood Cabinets: Model No. 255 BRN with No. 256 BRN supports and matching fasteners.
   2. Omit standards where fixed shelves are indicated.
   3. All standards to be recess mounted (flush in routed dados), unless specifically indicated otherwise.

G. Cabinet Locks: Where indicated on the Drawings, provide cabinet manufacturer's standard 5-disc tumbler, cam type, keyed differently at each room , with metal strike screwed to wood surface, and master keyed.
   1. Furnish 2-keys for each lock.
   2. Furnish 5-master keys
   3. Finish to match Section 08 7100 - Finish Hardware finish in room(s) where occurs.
   4. Location: Where indicated.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

B. Pre-Installation Meeting: Meet at project site prior to delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor; Architect and other Owner Representatives (if any); Installers of architectural woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be maintained.

C. Deliver concrete inserts and similar anchoring devices to be built into substrates, well in advance of time substrates are to be built.
   1. Coordinate location and placement of concealed treated blocking (by others) prior to finish materials installations.

D. Prior to installation of architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.02 INSTALLATION:

A. Quality Standard: Install woodwork to comply with AWS Section 2, 6, 10, 11 for the same grade specified in Part 2 of this Section for type of woodwork involved.

B. Install woodwork plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8-inch in 8'-0" for plumb and level (including tops); and with no variations in flushness of adjoining surfaces.

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
   1. Seal all hardware cuts, routed slots, etc., before installation of hardware.

D. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as

required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.

E. Standing and Running Trim, and Sills: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners and comply with referenced Quality Standards for joinery.

F. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated. Maintain veneer sequence matching (if any) of cabinets with transparent finish.
   1. Install cabinets with no more than 1/8-inch in 96-inches sag, bow, or other variation from a straight line.

G. Wood Storage Shelving: Complete the assembly of units and install in the areas indicated, including hardware and accessories as indicated.

H. Tops: Anchor securely to base units and other support systems indicated. Caulk space between backsplash and wall with specified sealant.
   1. Install countertops with no more than 1/8-inch in 96-inches sag, bow, or other variation from a straight line.

I. Wood Panels: Anchor panels to supporting substrate with concealed panel-hanger clips and by blind nailing on backup strips, splined-connection strips, and similar associated trim and framing. Do not face nail unless otherwise indicated.
   1. Install flush panels with no more than 1/16-inch in 96-inches vertical cup or bow and 1/8-inch in 96-inches horizontal variation from a true plane.

J. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

K. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.

L. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. and within 6 inches of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

M. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on brackets, and supports.
   1. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

N. Install rod flanges for rods as indicated. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Install rods in rod flanges.

O. Refer to Section 09 9100 - Painting, for final finishing of installed architectural woodwork which is indicated to be painted on-site.

3.03 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION:

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

D. Complete the finishing work specified as work of this section, to whatever extent not completed at shop or prior to installation of woodwork.

E. Provide final protection and maintain conditions, in a manner acceptable to Fabricator and Installer, which ensures architectural woodwork being without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 07 0553
FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 09 9100 - Painting.

1.03 REFERENCE STANDARDS

A. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.

C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 FIELD CONDITIONS

A. Do not install painted markings when ambient temperature is lower than recommended by coating manufacturer.

PART 2 PRODUCTS

2.01 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of ICC (IBC).

B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl or paper sign with factory applied adhesive backing.

C. Languages: Provide sign markings in English.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Locate markings as required by ICC (IBC).

B. Install adhered markings in accordance with manufacturer's instructions.

C. Install neatly, with horizontal edges level.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION

SECTION 07 1300
SHEET WATERPROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 03 3000 - Concrete: Concrete substrate (floors and walls).

C. Section 07 6200 - Sheet Metal Flashing and Trim: Metal termination bar.

D. Section 07 9010 - Joint Sealers: Sealant for joints in substrates.

E. Section 31 2000 - Earth Moving.

F. Section 33 4600 - Subdrainage.

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

B. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.

C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for membrane.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Manufacturer's Installation Instructions: Indicate special procedures and acceptable installation temperatures.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Specimen Warranty.

G. LEED Submittals:
   1. For products specified in this Section, submit documentation of recycled content and location of manufacture.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Single Source Responsibility:
   1. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer.
   2. Blind-side waterproofing products and sheet waterproofing for below-grade walls shall be provided by same manufacturer for single source responsibility and materials compatibility.

D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
   1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
   2. Protect mastic and adhesive from moisture and potential sources of ignition.
   3. Store drainage composite or protection board flat and off the ground. Provide cover on top and all sides.
   4. Protect surface conditioner from freezing.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.07 PROJECT/SITE CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and perparation work is complete and in condition to receive sheet membrane waterproofing.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty upon completion of the work. , except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 - PRODUCTS

2.01 SHEET WATERPROOFING APPLICATIONS

A. Self-Adhered Rubberized Asphalt Sheet Membrane:
   1. Location: All below grade and foundation walls.
   2. Cover with protection board.

2.02 MANUFACTURERS/PRODUCT

A. W. R. Grace & Co.-Conn. Preprufe 300R (for below-slab), and Bituthene System 4000 Membrane (for below grade walls) [Basis of Design]: www.graceconstruction.com.

B. Other Acceptable Manufacturers (Subject to meeting specifications):
   1. Carlisle Coatings & Waterproofing, Inc; Product CCW Miraweld-H (for below-slab), and CCW MiraDRI 860/861 (for below grade walls): www.carlisle-ccw.com.
   2. W. R. Meadows: www.wrmeadows.com ; Product Precon (for below-slab), and MEL-ROL (for below grade walls).
   3. Substitutions: See Section 01 6000 - Product Requirements.
   4. Products:
      a. W. R. Grace: Bituthene 4000: www.gcpat.com
      b. Carsile; CCW MiraDRI 860/861: www.carsileccw.com
      c. W. R. Meadows; MEL-ROL: www.wrmeadows.com

C. Sheet Waterproofing (for blind side waterproofing of Below Grade Slab): Multi-layered composite sheet consisting of HDPE film, protective coating with pressure-sensitive adhesive

and removable release liner; having an overall nominal thickness of 0.046 in. (1.2mm). Product is applied over prepared substrate, ready to receive cast concrete onto the adhesive side of the membrane.

D. Sheet Waterproofing (for Below Grade Wall): Flexible, pre-formed waterproof composite membrane consisting of 0.056 in. (1.4mm) rubberized asphalt, and 0.004 in. (0.1mm) of cross-laminated, high density polyethylene film (HDPE) with self-adhesive surface, and with removable release sheet.
   1. Use with water-based surface conditioner formulated to prepare substrate for waterproofing membrane.

E. Termination Bars: Stainless steel; compatible with membrane and adhesives. (See Section 07 6200.)

F. Surface Conditioner: Type compatible with membrane.

2.03 ACCESSORIES

A. Drainage Panel: 0.433 inch thick geocomposite drainage sheet system, comprising a hollow studded polystyrene core, covered on one side with a nonwoven, needle punched polypropylene filter fabric and on the other side with a smooth polymeric film. Drainage panel may serve as protection board if approved by manufacturer. Provide separate protection board if recommended by manufacturer.

B. Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, terminations, cants, tape and accessories: acceptable to manufacturer of sheet membrane waterproofing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting work.

B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

C. Verify that items penetrating surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

D. Cast-In-Place Concrete Substrate:
   1. Do not proceed with installation until concrete has properly cured and dried - minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete.
   2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
   3. Repair bugholes over 0.5 inch in length and 0.25 inch deep and finish flush with surrounding surface.
   4. Remove scaling to sound, unaffected concrete and repair exposed area.
   5. Grind irregular construction joints to suitable flush surface.

E. Seal cracks and joints with sealant using depth to width ratio as recommended by sealant manufacturer.

F. Treat joints and install flashing as recommended by waterproofing manufacturer.

G. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

H. Apply surface conditioner at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of surface conditioner.

I. Delay application of membrane until surface conditioner is completely dry. Dry time will vary with weather conditions.

J. Ensure plastic release liner is removed from underslab waterproofing before pouring concrete is poured.

K. Pour concrete over underslab waterproofing within time recommended by manufacturer from date membrane is placed.

L. Place and compact concrete over underslab waterproofing carefully to avoid damage to the membrane. Avoid use of sharp objects to consolidate concrete.

M. Seal daily terminations with troweled bead of mastic.

N. Install termination bar at top of waterproofing.

O. Installation shall be according to manufacturer's details to satisfy warranty requirements.

3.03 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

A. Apply protection board and related materials in accordance with manufacturer's recommendations.

B. Adhere protection board to substrate with compatible adhesive.

3.04 CLEANING

A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.

3.05 PROTECTION

A. Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

END OF SECTION

SECTION 07 1400
FLUID-APPLIED AIR BARRIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Sealants for substrates of fluid-applied air barrier.

B. Other Accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 04 2000 - Unit Masonry: Masonry joints prepared to receive flashings.

C. Section 07 1300 - Sheet Waterproofing: Sheet membrane waterproofing for below grade slab and walls.

D. Section 07 6200 - Sheet Metal Flashing and Trim: Metal parapet covers, copings, and counterflashings.

E. Section 07 9010 - Joint Sealers: Sealant for joints other than substrates for air barrier in this Section.

F. Section 09 2116 - Gypsum Board Assemblies: Exterior sheathing receiving fluid-applied air barrier.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course; 2018 (Reapproved 2022).

C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

D. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for air barrier system(s) specified.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures and acceptable installation temperatures.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Membrane Manufacturer Qualifications: Company specializing in fluid-applied air barrier membranes with ten years experience.

B. Installer Qualifications: Company specializing in installation of fluid-applied air barrier with minimum five years documented experience.

C. Mock-Up: Include Fluid-Applied Air Barrier in Mock-Up as described in Section 01 4000 - Quality Requirements.

D. Comply with ALL special requirements and inspections of air barrier system manufacturer, as required to obtain the required 5-year labor and materials warranty.

E. Single-Source Responsibility: Obtain primary air barrier materials of each type required from a single manufacturer.

F. Sealant for Substrate Surfaces: Sealant shall be manufactured by same manufacturer as fluid-applied air barrier.

1.06 FIELD CONDITIONS

A. Maintain range of ambient and substrate temperatures recommended by air barrier manufacturer. Do not apply product to wet substrate or during snow, rain, fog, or mist.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five (5) year manufacturer warranty for air barrier failing to resist penetration of water , except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Waterproofing Vapor Permeable Air Infiltration Barrier System (for CMU and Sheathing):
   1. GE "Elemax 2600 AWB" 100% Silicone Air and Water-Resistive Barrier system; [Basis of Design]: www.siliconeforbuilding.com/AWB/.
   2. Dow Corning "DefendAir 200" Silicone Liquid Applied Air & Weather Barrier: www.dowcorning.com.
   3. Pecora "XL-Perm Ultra VP" Air, Vapor & Water Barrier System: www.pecora.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Joint Reinforcing/Transition Strip: 2" wide glass fiber tape, self-adhesive polymeric air/vapor barrier membrane (30 mil minimum), or other material applicable for application, which is approved by air barrier manufacturer.

C. Surface Conditioner: Compatible with membrane compound; as recommended by membrane manufacturer.

D. Sealant for Substrate Surfaces: As recommended by membrane manufacturer.

E. Liquid Membrane for details and terminations: As recommended by membrane manufacturer.

F. Detail Membrane: Flexible, fully-adhered membrane for detail flashing areas: As recommended by membrane manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter, including efflorescence, detrimental to adhesion or application of air barrier system.

C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of air barrier materials.

D. Verify that items that penetrate surfaces to receive air barrier are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive air barrier.

B. Do not apply air barrier to surfaces unacceptable to manufacturer.

C. Caulk sheathing joints prior to application of water/air barrier coating. Caulk with manufacturer-recommended joint sealant reinforced with fiberglass mesh tape encapsulated in sealant. Encapsulate fastener heads with manufacturer-recommended sealant. Fiberglass reinforcement is not required for sheathing fastener heads.
   1. Verify that Fluid-Applied air barrier is compatible with sealant used.

D. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

E. All surfaces must be sound and free from spalled areas, loose aggregate, loose nails or screws, sharp protrusions or other matter that will hinder the adhesion or regularity of the membrane installation. The surface must also be free from frost, dirt, grease, oil or other contaminants. Clean loose dust and dirt from the surface by brushing or wiping with a clean, dry cloth.

F. Concrete and other monolithic cementitious surfaces: Pretreat surface irregularities and large voids with liquid membrane, or repair with lean mortar mix or nonshrinking grout.

G. CMU surfaces: Strike joints full and flush to face of concrete block. Ensure surface is smooth and free from projections. Fill voids and holes with lean mortar mix or nonshrinking grout.

H. Sheathing panels: Fasten corners and edges with appropriate screws. Drive fasteners flush with panel surface (not countersunk). Tape panel butt joints with 2 in. wide sheathing tape recommended by manufacturer.

I. Complete detailing prior to applying air barrier.

J. Fill and seal cracks and joints between exterior sheathing panels or adjacent substrates, or in masonry, with trowel application of air barrier product and reinforce with strip of 2" (minimum) wide glass fiber tape. Follow manufacturer's instructions if other joint treatment is recommended. Allow recommended cure time before proceeding.

K. Proceed with applying air barrier only after substrate cleaning, sealing, and other preparation and sealing of joints and penetrations have been completed.

L. Apply air barrier in accordance with manufacturer's instructions .

M. Apply surface conditioner (if required) at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.

N. Apply by spray a complete and continuous unbroken film of liquid air and water barrier membrane.

O. Apply air barrier in accordance with manufacturer's instructions to uniform wet film thickness in order to dry to thickness recommended by manufacturer to achieve performance specified.
   1. Apply more than one coat, if recommended by manufacturer.

P. Roll the air barrier after spray application to fill all pin holes.

Q. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

R. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - QUALITY REQUIREMENTS for additional requirements.

B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing.

C. Provide periodic on-site attendance of waterproofing, airbarrier, roofing and insulation manufacturer's representative during installation of this work.

3.04 CLEANING AND PROTECTION

A. Do not inhibit damp substrate from drying out. Do not expose the backside of the substrate to moisture or rain.

B. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

C. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 180 days.

D. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construcion.

E. Remove masking materials after installation.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Board insulation at cavity wall construction, and as indicated.

B. Batt insulation in walls where indicated.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 04 2000 - Unit Masonry Assemblies: Cavity walls for board insulation.

C. Section 05 4000 - Cold-Formed Metal Framing: Supporting structure for batt insulation, where indicated.

1.03 REFERENCE STANDARDS

A. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2022.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.05 MOCK-UP

A. Include Thermal Insulation in mock-up as described in Section 01 4000 - Quality Requirements.

1.06 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 - PRODUCTS

2.01 APPLICATIONS

A. Insulation Inside Masonry Cavity Walls: Expanded polystyrene (EPS) board.

B. Insulation Over Metal Stud Framed Walls, Continuous: Extruded polystyrene (XPS) carbon black board.

C. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

D. Insulation Above Ceilings (where indicated): Batt insulation with foil-scrim-kraft (FSK) faced vapor retarder. Batt insulation with no vapor retarder (i.e. unfaced batts) where used with sheet vapor barrier.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation at masonry cavity walls: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
   1. Board Size: 48 x 96 inch.
   2. Board Thickness: As indicated in the Drawings.
   3. Products:
      a. Dow Chemical Company: www.dow.com.

b. DiversiFoam Products: www.diversifoam.com.
c. Owens Corning Corp: www.owenscorning.com.
d. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com.

B. Extruded Polystyrene (XPS) Continuous Insulation (CI) Board: Comply with ASTM C578, and manufactured using carbon black technology.
1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
3. Type and Thermal Resistance, R-value: Type IV, 5.6 (0.98), minimum, per 1 inch thickness at 75 degrees F mean temperature.
4. Board Size: 48 inch by 96 inch.
5. Board Thickness: As indicated in the drawings.
6. Board Edges: Shiplap, at long edges.

2.03 ACCESSORIES

A. Tape: Polyethylene self-adhering type, 1.75 inch wide minimum, unless greater width recommended by manufacturer.
1. 3M "Construction Seaming Tape 8087": www:3M.com.
2. Dow "Weathermate Construction Tape": www.dowbuildingsolutions.com.
3. Typar "Typar Construction Tape": www.typar.com.

B. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

3.02 BOARD INSTALLATION AT CAVITY WALLS

A. Adhere a 6 inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
1. Tape seal joints between sheets.
2. Extend sheet full height of joint.

B. Apply adhesive to back of boards:
1. Three continuous beads per board length.
2. Apply beads of adhesive oriented vertically so as not to disrupt the drainage plane between the water/air barrier coating and cavity insulation.

C. Install boards to fit snugly between wall ties.

D. Install boards horizontally on walls.
1. Place boards to maximize adhesive contact.
2. Install in running bond pattern.
3. Butt edges and ends tightly to adjacent boards and protrusions.
4. Tape seal board joints.

E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

F. Place 6 inches wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

G. Retain insulation batts under overhead joists/rafters/trusses with sheet vapor barrier under framing members.

H. Install sheet vapor barrier under trusses with foil facing down. Overlap layers as recommended by manufacturer. Attach vapor barrier as recommended by manufacturer. Tape joints with reinforced foil tape recommended by manufacturer.

I. Lay insulation batts over top of sheet vapor barrier.

J. All wet insulation shall be removed and replaced. Provide letter to Architect for record of each occurrence.

K. Visible gaps and voids for insulation on sheet vapor barrier shall be filled.

3.03 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

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SECTION 07 2129
SPRAYED INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Sprayed insulation.
   1. In masonry cavity walls.
   2. In metal stud box headers.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

B. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2010.

C. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2013.

F. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

G. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, insulation properties, and preparation requirements.

C. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

D. Certificates: Certify that products of this section meet or exceed specified requirements.

1.06 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. Source Quality Control: Product produced in an ISO 9001 registered factory.

C. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years of experience and which has been trained and licensed by the manufacturer.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke limitations.

1.08 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

1.09 WARRANTY

A. Manufacturer's standard limited lifetime warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Spray Foam Insulation:
   1. "Core-Fill 500", as manufactured by Tailored Chemical Products, Inc.; Hickory, N.C .; Phone: 1-800-627-1687: www.core-fill500.com.
   2. Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam: www.jm.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Foamed-In-Place Masonry Insulation: Two component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
   1. Surface Burning Characteristics: Maximum flame spread, smoke developed and fuel contributed of 0, 5, and 0 respectively, when tested in accordance with ASTM E 84.
   2. Combustion Characteristics: Class A.
   3. Thermal Resistivity: R of 4.6 per inch @ 32 degrees F mean; ASTM C-177.
   4. Water Vapor Transmission: 6.63 perms, measured in accordance with ASTM E 96.
   5. Water Absorption: 3% Droplet Test, Floating Test, 1 hr. 15 min.
   6. Density: .8 lb/cu ft, dry, when tested in accordance with ASTM D 1622.
   7. Sound Abatement: Minimum Sound Transmission Class (STC) rating of 53 for 8" wall assembly. (ASTM E 90-90)

B. Foamed-In-Place Insulation: High-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Aged Thermal Resistance (R-value): 5 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.
   2. Water Vapor Permeance: Vapor retarder; 1 perm, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
   3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
   4. Air Permeance: 0.004 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.5 psf.
   5. Closed Cell Content: At least 90 percent.
   6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

C. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 200 deg. F per ASTM C 411 or in accordance with authorities having jurisdiction.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

3.03 APPLICATION

A. Site mix liquid components manufactured and supplied by manufacturer of approved insulation.

B. Apply insulation to substrates in accordance with manufacturer's instructions.

C. Apply insulation to produce thickness required for indicated R value.

D. Extend insulation in thickness indicated to envelop entire area to be insulated.

E. Holes for installation of foam insulation shall occur in and be no larger than typical 3/8-inch mortar joints. Patches for holes shall be for the full depth of mortar removed by drilling, and shall match adjacent mortar joint tooling and texture.

F. If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

G. Patch damaged areas: Any repairs shall be made by licensed dealer.

3.04 FIELD QUALITY CONTROL

A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 01 4000.

B. Inspection will include verification of insulation thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

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SECTION 07 2400
EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Composite wall and soffit cladding of rigid insulation and reinforced finish coating ("Class PB").

B. Drainage and water-resistive barriers behind insulation board.

C. Air/water resistive barrier behind masonry.

D. Joint treatment of Exterior Gypsum Sheathing Board.

E. Provision of compatible Through Wall Flashing materials for installation under Section 04 2000 - Unit Masonry.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 01 4000 - Quality Requirements: Requirements for mock-up.

C. Section 05 4110 - Pre-Panelized Load-Bearing Steel Stud Wall

D. Section 07 6200 - Sheet Metal Flashing and Trim: Perimeter flashings.

E. Section 07 9005 - Joint Sealers: Perimeter and penetration sealants.

F. Section 09 2116 - Gypsum Board Assemblies: Gypsum exterior gypsum board.

1.03 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2022.

C. ASTM C1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage; 2025.

D. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2025.

E. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity; 2025.

F. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

H. ASTM E2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies; 2025.

I. ASTM E2486/E2486M - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS); 2022.

J. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013 (Reapproved 2021).

K. ASTM G155 - Standard Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials; 2025.

L. ICC-ES AC219 - Acceptance Criteria for Exterior Insulation and Finish Systems; 2009, with Editorial Revision (2022).

M. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies; 2015, with Editorial Revision (2022).

N. NFPA 259 - Standard Test Method for Potential Heat of Building Materials; 2023, with Errata.

O. NFPA 268 - Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2022.

P. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
   1. Submit evidence of qualifications and training of GC's representative who will monitor EIFS installation, as described in Quality Assurance below.

C. Shop Drawings: Indicate wall and soffit joint patterns, joint details, and molding profiles.

D. Certification: Provide certification that products provided are the same products recommended by manufacturer for EIFS system selected and used.

E. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.

F. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.

G. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

1.05 QUALITY ASSURANCE

A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.

B. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
   1. Member in good standing of EIMA (EIFS Industry Members Association).
   2. Manufacturer of EIFS products for not less than 5 years.

C. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.

D. Installer Qualifications: Company specializing in the type of work specified and with at least five years of documented experience and approved by manufacturer.

E. The EIFS Manufacturer shall perform a project specific constructability review of the contract documents with a written report being submitted to Architect at time of product data submittal.

F. The EIFS Manufacturer shall attend a mandatory pre-construction meeting and shall provide personnel to perform a minimum of one field inspection per building during construction and a final inspection following completion of EIFS installation to confirm proper installation means and methods are being utilized and for warranty purposes. Manufacturer shall provide a written report of all field inspections to Architect. Manufacturer shall schedule and notify Contractor, Architect, and program manager significantly in advance of the date and times of scheduled inspections.

G. The General Contractor shall provide at least one member of the project team, based on site, who is designated and responsible for observing and monitoring all EIFS installation, and who has received formal training on EIFS systems. This individual shall be responsible for the ongoing and continuous inspection and photo documentation of all EIFS substrate and systems

before, during and at completion of installation. This individual shall have a minimum of 3 years applicable prior-construction experience. Provide evidence of designated individual's qualifications and training to Architect for approval at time of EIFS product data submittal.

H. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

I. The EIFS contractor shall cooperate fully with and provide the equipment and personnel required to assist the Owner's waterproofing consultant as may be applicable during any inspection and testing related to the EIFS installation.

1.06 MOCK-UPS

A. Include Exterior Insulation and Finish System in mock-up as described in Section 01 4000 - Quality Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.

B. Storage: Store materials as directed by manufacturer's written instructions.
   1. Protect adhesives and finish materials from freezing, temperatures below 40 degrees F and temperatures in excess of 90 degrees F.
   2. Protect Portland cement based materials from moisture and humidity. Store under cover off the ground in a dry location.
   3. Protect insulation materials from exposure to sunlight.

1.08 FIELD CONDITIONS

A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.

B. Do not install coatings or sealants when ambient temperature is below 40 degrees F.

C. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.09 WARRANTY

A. The EIFS Contractor shall include in his price and be responsible for any modifications, additions or reductions to the Contract drawings and specifications to obtain the manufacturer's warranty.

B. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

C. Provide manufacturer's standard material warranty, covering a period of not less than 10 years.

D. Provide separate warranty from installer covering labor for repairs or replacement for a period of not less than 10 years.

E. The manufacturer shall perform follow-up site inspections at the following intervals following substantial completion to verify proper performance and integrity of the system: Years 1, 3, and 5. A written report of all inspections shall be provided to the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Dryvit Systems, Inc.; Dryvit Outsulation Plus MD Exterior Insulation and Finish System, Class PB with Moisture Drainage: www.dryvit.com

B. Other Acceptable Manufacturers:
   1. Sto Corp: www.stocorp.com/sle.

2. BASF Wall Systems (Senergy, Finestone, Acrocrete, SonoWall): www.wallsystems.basf.com.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

A. Fire Characteristics:
   1. Flammability: Pass, when tested in accordance with NFPA 285.
   2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.
   3. Potential Heat of Foam Plastic Insulation Tested Independently of Assembly: No portion of the assembly having potential heat that exceeds that of the insulation sample tested for flammability (above), when tested in accordance with NFPA 259 with results expressed in Btu per square foot.

B. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.

C. Drainage Efficiency: Average minimum efficiency of 90 percent, when tested in accordance with ASTM E2273 for 75 minutes.

D. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.

E. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.

F. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycles 1, 5, or 9.

G. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.

H. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.

I. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

J. Impact Resistance: Construct system to provide the following impact resistance without exposure of broken reinforcing mesh, when tested in accordance with ASTM E2486/E2486M:
   1. Medium: 50 to 89 in-lb, for areas with limited access to public.
   2. High: 90 to 150 in-lb, for areas with general access to public.
   3. Ultra-High: Over 150 in-lb, for areas subject to potential abuse.

2.03 MATERIALS

A. Materials and Components shall be those specified by Manufacturer of selected manufacturer and system.

B. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
   1. Textures: Medium, and Smooth (Limestone).
   2. Color: As selected by Architect from manufacturer's standard range.

C. Base Coat: Fiber-reinforced, acrylic or polymer-based product compatible with insulation board and reinforcing mesh, Class PB.

D. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.

E. Insulation Board: Molded expanded polystyrene (EPS) board insulation, ASTM C578, Type XI, with the following characteristics:
   1. Board Thickness: As indicated on drawings. Minimum: 2 inches.

F. Water-Resistive Barrier Coating: Fluid-applied air and water barrier membrane; applied to sheathing; furnished or approved by EIFS manufacturer.
   1. Dryvit Backstop NT: Flexible, polymer-based noncememtitious water-resistive and air barrier coating.
   2. Dryvit Grid Tape: Open weave fiberglass mesh tape with pressure sensitive adhesive.
   3. Dryvit Backstop DMS: Sprayable single step water-resistive membrane/air barrier and adhesive.

G. Flashing Tape: Self-adhering rubberized asphalt tape with polyethylene backing or other material and surface conditioner furnished or approved by EIFS manufacturer.

2.04 ACCESSORIES

A. Metal Flashings: See Section 07 6200.

B. Trim: EIFS manufacturer's standard PVC or galvanized steel trim accessories, as required for a complete project and including starter track and drainage accessories.

C. Sealant Materials: Compatible with EIFS materials and as recommended by EIFS manufacturer.

D. Exterior Soffit Vents (If indicated): One piece, perforated, ASTM B221 6063 T5 alloy aluminum, with plaster or EIFS edge and manufactured especially for soffit application. Provide ventilation area shown on drawings., 6" wide, unless indicated otherwise.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.

B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

3.02 INSTALLATION - GENERAL

A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
   1. Where different requirements appear in either document, comply with the most stringent.
   2. Neither of these documents supercedes provisions of Contract Documents that defines contractual relationships between parties or scope of this work.

3.03 INSTALLATION - INSULATION

A. Install in accordance with manufacturer's instructions.

B. Prior to installation of boards, install starter track and other trim level and plumb and securely fastened. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.

C. Install back wrap reinforcing mesh at all openings and terminations that are not to be protected with trim.

D. On wall surfaces, install boards horizontally.

E. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.

F. Fill gaps greater than with strips or shims cut from the same insulation material.

G. Rasp irregularities off surface of installed insulation board.

H. Adhesive Attachment: Use method required by manufacturer to achieve drainage efficiency specified; do not close up drainage channels when placing insulation board.

3.04 INSTALLATION - CLASS PB FINISH

A. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at terminations of EIFS. Install reinforcing fabric as recommended by EIFS manufacturer.
   1. Lap reinforcing mesh edges and ends a minimum of 2-1/2 inches.
   2. Allow base coat to dry a minimum of 24 hours before next coating application.

B. Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.

C. Finish Coat Thickness: As recommended by manufacturer.

D. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.

E. Apply sealant at finish perimeter and expansion joints in accordance with Section 07 9005.

3.05 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

3.06 PROTECTION

A. Protect completed work from damage and soiling by subsequent work.

END OF SECTION

SECTION 07 5200
MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cold Applied Modified bituminous roofing membrane, conventional application.

B. Insulation, flat and tapered.

C. Cover boards.

D. Roofing cant strips and walkway pads.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this project.

B. Section 05 3100 - Steel Decking: Placement of acoustical insulation for deck flutes.

C. Section 06 1000 - Rough Carpentry: Wood cant strips, nailers, and curbs.

D. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings and termination bars.

E. Section 07 7100 - Roof Specialties: Roof edge flashings, copings, and fascias.

F. Section 07 7123 - Manufactured Gutters and Downspouts.

G. Section 07 7200 - Roof Accessories: Roof-mounted units and prefabricated curbs.

1.03 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2022a.

C. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2023).

D. ASTM D312/D312M - Standard Specification for Asphalt Used in Roofing; 2016a (Reapproved 2023).

E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement; 2025.

F. ASTM D6164/D6164M - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements; 2021.

G. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.

H. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).

I. FM DS 1-28 - Wind Design; 2015, with Editorial Revision (2022).

J. NRCA (RM) - The NRCA Roofing Manual; 2026.

K. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Roofing Conference: Convene one month before starting work of this section.

1. 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, General Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable) and the Roofing Materials

Manufacturer (if warranty is required of this manufacturer). If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting.

2. 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 specifications, roof plans, roof deck information, flashing details and approved 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.
3. The following are to be accomplished during the conference:
    a. Review all Factory Mutual and Underwriters Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise.
    b. Establish trade-related job schedules, including the installation of roof-mounted mechanical equipment.
    c. Establish roofing schedule and work methods that will prevent roof damage.
    d. Require that all roof penetrations and walls be in place prior to installing the roof.
    e. Establish those areas on the job site that will be designated as work and storage areas for roofing operations.
    f. Establish weather and working temperature conditions to which all parties must agree.
    g. 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.
4. Copies of all roofing submittals and roof warranty information shall be submitted for review and returned Approved prior to pre-roofing conference. These submittals shall be job specific containing project name, location, etc.
5. 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 record and copies furnished the General Contractor, and the Owner

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's catalog data for membrane and bitumen materials, base flashing materials, insulation, surfacing, and fasteners.

C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout.

D. Samples: Submit two samples 12 by 12 inches in size illustrating granule surfaced sheet, insulation, and cover boards.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

G. Installer's qualification statement.

H. Specimen Warranty:
    1. Provide an unexecuted copy of the warranty specified for this Project. Identify the terms and conditions required of the manufacturer along with any and all additionally required riders. Identify the terms and conditions required of the Owner to maintain the warranty.
        a. Submit a letter from the Roofing Contractor to be included in the warranty. This letter shall be signed and dated to indicate the Roofing Contractor has reviewed the roofing

system and therefore warrants the system as designed and intended to be warrantied.

b. Submit a letter from the roofing manufacturer to be included in the warranty. This letter shall be signed and dated by a manufacturer's representative to indicate the manufacturer has reviewed the roofing submittal from the Roofing Contractor and confirms compliance with specifications based on materials supplied in the submittal.

I. Warranty Documentation:
1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
2. Submit installer's written verification that installation complies with warranty conditions for waterproof membrane.
3. Include wind-uplift resistance language.
4. Roofing and insulation manufacturers shall submit a letter stating they will provide site inspections that confirm the project is being constructed as specified, by an experienced, full-time employee of the respective manufacturer. This letter shall be submitted with sample warranty submittal.
5. Provide Manufacturer's documentation certifying that the roof design provided complies with the performance requirements for that particular system, as set forth in IBC Chapter 15 in Section 1504. The documentation shall be attached to the roof warranty provided at the close-out of the project.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, and approved by manufacturer.

C. Insurance and Code Requirements: Provide materials complying with governing regulations that can be installed to comply with the following, and provide installation to comply:
1. UL Fire Classified.
2. Wind Uplift Resistance: As per local building code and warranty requirements.
3. FM 1-90 wind uplift rating.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact unless otherwise indicated.

B. Store materials in weather protected environment, clear of ground and moisture; ballast materials may be stored outdoors.

C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

D. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane when environmental conditions are outside the ranges recommended by manufacturer.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. General Contractor's Roofing Guarantee.

C. Special Project Guarantee: Submit three executed copies of Roofing Guarantee on the form at the "General Conditions" Section of the Project Manual, covering the work of this Section, including roofing membrane, composition flashing, roof insulation, any vapor retarders, and roofing accessories, signed by the Contractor.

D. Provide all necessary roof, and related, components to achieve specified warranty.

E. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes. Warranty shall be manufacturer's standard "No Dollar Limit" ("NDL") labor and material warranty agreement including flashing endorsement, and non-depreciating full replacement warranty, signed by an authorized representative of the manufacturer. Provide form that was published and submitted with product literature as of date of Contract Documents for the following and period of time:
   1. Warranty Term: 20 years.
   2. Include language relating to wind-uplift resistance.
   3. For repair and replacement include costs of both material and labor in warranty. Warranty shall cover in part, wind load, leakage or failure caused by improper workmanship or materials, to include insulation, insulation adhesives, fasteners, membrane adhesives, field membranes, and sheet metal work.
   4. Hail Resistance Rating: SH-Severe Hail.

F. The Guarantee and Warranty shall be governed by the laws of the State of Alabama and be in addition to and run concurrently with other warranties made by the Contractor under the requirements of the Contract Documents, and shall not limit or deprive the Owner of any other rights the Owner may have for remedy.
   1. Unless manufacturer's warranty agrees to arbitration through the American Arbitration Association or directly references State of Alabama for enforcement, manufacturer shall provide warranty rider stating that manufacturer's warranty is governed by and shall be enforced in accordance with laws of Alabama, and that in the event of a conflict between the provisions of the Warranty and the provisions of the rider, the provisions of the rider shall control.
   2. Exceptions are not Permitted:
      a. Damage due to roof traffic.
      b. Damage due to wind speed greater than 56 miles per hour but less than 90 miles per hour.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cold Applied Modified Bituminous Membrane Roofing:
   1. GAF: www.gaf.com/#sle.
   2. Johns Manville: www.jm.com/e
   3. Soprema: www.soprema.us
   4. Simon Roofing: www.simonroofing.com
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Insulation:
   1. Atlas Roofing Corporation: www.atlasroofing.com.
   2. Dow: www.dow.com/#sle.

3. Owens Corning Corporation: www.owenscorning.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROOFING - CONVENTIONAL APPLICATION

A. Cold Applied Modified Bituminous Membrane Roofing: Two-ply membrane, with insulation.

B. Roofing Assembly Requirements:
1. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value.
a. Calculate SRI in accordance with ASTM E1980.
b. Field applied coating may not be used to achieve specified SRI.
2. External Fire Exposure Classification: ASTM E108 Class A, UL (FRD) listed.
3. Wind Resistance Classification: Factory Mutual 1-90, in accordance with FM DS 1-28.
4. Insulation Thermal Resistance (R-Value): 5 per inch, minimum; provide insulation of thickness required to achieve R-25, minimum.

2.03 MEMBRANE AND SHEET MATERIALS

A. Membrane: Polymer modified asphalt, reinforced with nonwoven fabric; granule surfaced; with the following characteristics:
1. Minimum Quality: ASTM D6164/D6164M Type I; styrene-butadiene-styrene (SBS) modified, polyester reinforced. Minimum 120mils thick.
2. Cap Sheet Color: White.
3. Sheet Width: 3.28 ft (1.0 meters)

B. Flexible Flashing Material: Same material as membrane.

2.04 BITUMINOUS MATERIALS

A. Bitumen: D 3019, Type III, Grade 2

B. Asphalt Primer: ASTM D41/D41M, asphalt type.

C. Asphalt Roof Cement: ASTM D4586/D4586M, Type II, asbestos-free.

2.05 COVER BOARDS

A. Cover Boards: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
1. Thickness: 1/4 inch, fire-resistant.
2. Products:
a. Georgia-Pacific; DensDeck: www.densdeck.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

2.06 INSULATION

A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam complying with ASTM C1289.
1. Classifications:
a. Type II:
1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
2) Compressive Strength: Classes 1-2-3, Grade 1 - 16 psi (110 kPa), minimum.
3) Thermal Resistance, R-value: At 1-1/2 inches thick; Class 1, Grades 1-2-3, 8.4 (1.48) at 75 degrees F.
2. Board Size: 48 by 96 inches.
3. Board Thickness: As required to achieve R-25 minimum.
4. Tapered Board: Slope as indicated; minimum thickness 1 inch; fabricate of fewest layers possible.
5. Board Edges: Square.

2.07 SURFACING MATERIALS - CONVENTIONAL APPLICATION

A. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
   1. Composition: Asphaltic with mineral granule surface.
   2. Size: Manufacturers standard size.
   3. Thickness: 1/2 inches.
   4. Surface Color: White or Yellow.
   5. Products:
      a. W. R. Meadows, Inc; Whitewalk: www.wrmeadows.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.08 ACCESSORIES

A. Cant and Edge Strips: Asphalt-impregnated wood fiberboard, compatible with roofing materials ; cants formed to 45 degree angle.

B. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

C. Insulation Fasteners: Appropriate for purpose intended Factory Mutual and roofing manufacturer.

D. Roofing Nails: Galvanized, hot-dipped type, size and configuration as required to suit application.

E. Sealants: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips and nailing strips are in place.

3.02 PREPARATION - METAL DECK

A. Install preformed acoustical glass fiber insulation strips in roof deck flutes in accordance with manufacturer's instructions; see Section 05 3100.

3.03 INSTALLATION - INSULATION, CONVENTIONAL

A. Attachment of Insulation: Embed each layer of insulation adhesive in accordance with roofing and insulation manufacturers' instructions.

B. Cover Boards: Attach cover boards in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.

C. Lay subsequent layers of insulation with joints staggered minimum 6 inches from joints of preceding layer.

D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

F. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

G. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 24 inches.

H. Do not apply more insulation than can be covered with membrane in same day.

3.04 INSTALLATION - MEMBRANE

A. Install modified bituminous membrane roofing system in accordance with manufacturer's recommendations and NRCA (RM) applicable requirements.

B. Install membrane; lap and seal edges and ends permanently waterproof.

C. Install smooth, free from air pockets, wrinkles, fish-mouths, or tears. Ensure full bond of membrane to substrate.

D. At end of day's operation, install waterproof cut-off. Remove cut-off before resuming roofing.

E. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 8 inches onto vertical surfaces.
   2. Apply flexible flashing over membrane.
   3. Secure flashing to nailing strips at 4 inches on center.

F. At gravel stops, extend membrane and base sheet under gravel stop and to the outside face of the wall.

G. Around roof penetrations,h seal flanges and flashings with flexible flashing.

H. Coordinate installation of roof drains and related flashings.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - QUALITY REQUIREMENTS for additional requirements.

B. The manufacturer shall provide onsite observations at least 2 times weekly during installation accompanied by a written report with photos for each observation. The manufacturer's representative must be an employee of the manufacturer.

3.06 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

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SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Self-Adhered Membrane Flashing.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 01 4000 - Quality Requirements: General requirements for mock-ups.

C. Section 04 2000 - Unit Masonry Assemblies: Through-wall flashings in masonry.

D. Section 07 1300 - Sheet Waterproofing: Termination bar specified herein used.

E. Division 7 Membrane Roofing Sections: Termination bar specifed herein used at membrane roofing turning up vertical surfaces.

F. Section 07 7100 - Roof Specialties: Manufactured copings, and roof edge flashings.

G. Section 07 7123 - Manufactured Gutters and Downspouts.

H. Section 07910 - Joint Sealers.

I. Section 09 9100 - Painting: Field painting.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. CDA A4050 - Copper in Architecture - Handbook; Current Edition.

C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two samples 8 by 10 inch in size illustrating metal finish color.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

C. Single-Source Responsibility: Self-adhering flashings at rough openings shall be manufactured by manufacturer of water/air barrier coating specified in Section 07 1400 - Fluid-Applied Air Barrier, for material compatibility and single-source manufacturing responsibility.

D. Coordination with Metal Roof Panels: Coordinate product selection of self-adhered membrane flashing used for underlayment at metal roof, with metal roofing supplier to assure compatibility.

E. Mock-Up: Include Sheet Metal Flashing and Trim in mock-up as described in Section 01 4000 - Quality Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 3 - EXECUTION

2.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

2.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

C. Seal metal joints watertight.

D. Install continuous through-wall flashing and sub-sill flashing with interior end dam prior to setting doors and windows. Typical at head and sill conditions. Jamb flashing to terminate in sub-sill flashing. Install metal head flashing at all window and door heads per manufacturer's standard detail.

E. Where sloping roof abutts a wall, integrate metal step flashing into the shingle roofing in accordance with best industry standards to provide weathertight joint.

F. Apply Self-Adhered Membrane Flashing used as underlayment in accordance with manufacturer's recommendations.
   1. Lap in shingled manner.
   2. Flash perimeter of wall openings.
   3. Cover internal and external corners with additional layer of self-adhered membrane flashing.

G. Apply self-adhered flashing in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 07 7100
ROOF SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manufactured roof specialties, including roof edge flashings, copings, fascias, and scuppers.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 06 1000 - Rough Carpentry.

C. Section 07 5416 - Ethylene Interpolymer [KEE] Roofing.

D. Section 07 7123 - Manufactured Gutters and Downspouts.

E. Section 07 7200 - Roof Accessories: Manufactured roof hatches.

F. Section 07 9010 - Joint Sealers.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.

C. NRCA (RM) - The NRCA Roofing Manual; 2026.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on shape of components, installation instructions, available profiles, textures, colors, materials and finishes, anchor types and locations.

C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

D. Samples: Submit two samples of coping, and fascia, 12 inch long, x actual width, illustrating component shape, finish, for color selection.

E. Samples: Submit two appropriately sized samples of fascia, and coping and roof edge flashings, for color verification.

F. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of experience.
   1. Engage an experienced installer who has completed coping installations similar in materials, design, and extent to that indicated for project, that has resulted in construction with a record of successful service and performance.

B. Source limitations for system of accessories: Obtain each color, texture, pattern, and type of coping, and related accessories from one source, with resources to provide products of consistent quality in appearance and physical properties without delaying the work.

C. Mock-Up:

1. Include Roof Specialties in Mock-Up as described in Section 01 4000 - Quality Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials to Project site in manufacturer's unopened packages or bundles with labels intact.

B. Store materials in a dry, well-ventilated, weathertight place. Do not store even temporarily on the ground. Comply with manufacturer's written instructions for storage, handling, and protection.
   1. Refer to Division 1 Sections "Summary of Work" and "Special Conditions", for additional information and requirements regarding stored materials.

1.07 PROJECT CONDITIONS:

A. Weather Limitations: Proceed with roof specialty system installation only if existing and forecasted weather conditions permit the systems to be installed according to manufacturer's current written instructions and if substrate is completely dry.

1.08 WARRANTY:

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Project Warranty: Submit a written warranty, executed by roof specialty system manufacturer, agreeing to repair or replace coping and related trim systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 color-difference units as measured according to ASTM D 2244.
   1. Warranty Period: 20 years from date of Substantial Completion.

1.09 EXTRA MATERIALS:

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Furnish full lengths of coping system and related trim in a quantity equal to at least 2 percent of amount installed, in whole and unopened packages.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Roof Edge Flashings, Fascias, and Copings:
   1. Exceptional Metals : www.exceptionalmetals.com.

B. Other manufacturers: The following manufacturers are approved for the project subject to being able to provide the product which meets the specifications and drawings.
   1. Architectural Products Co: www.archprod.com.
   2. Metal-Era Inc: www.metalera.com.
   3. Metal Roofing Systems, Inc: www.metalroofingsystems.biz/#sle.

2.02 COMPONENTS

A. Copings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
   1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness, and finish as cap; concealed stainless steel fasteners.
      a. Brake-metal coping system with continuous clip across top of and length of parapet (full secondary concealed wall cap), with 1-inch high standing seam joints - filled with sealant, double-folded, and corners turned down at 45 degrees.

b. Overlap metal minimum 8".

2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
3. Material: Pre-Finished Aluminum-zinc alloy coated steel: ASTM A 792, 55% Aluminum, 43.5% Zinc, 1.5% Silicon Coating ("Galvalume"), with minimum 50,000 p.s.i. yield.
4. Thickness: 24-gauge, 0.024-inch, minimum.
5. Finish: 3-coat full strength (70-percent) Kynar 500 resin (20 year) finish.
   a. Color: As selected by Architect from Manufacturer's full range of colors and custom colors.
6. Primer: Zinc molybdate type.

B. Scuppers: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
1. Configuration:
   a. Fabricate scuppers as detailed and in accordance with SMACNA Manual.
2. Material: Pre-Finished Aluminum-zinc alloy coated steel: ASTM A 792, 55% Aluminum, 43.5% Zinc, 1.5% Silicon Coating ("Galvalume"), with minimum 50,000 p.s.i. yield.
   a. Finish: 3-coat full strength (70-percent) Kynar 500 resin (20 year) finish.
      1) Color: As selected by Architect from Manufacturer's full range of colors.
   b. Thickness: 22 gage, 0.03 inch thick, minimum.
   c. Primer: Zinc molybdate type.

2.03 ACCESSORIES

A. Sealant: Type As specified in Section 07 9010.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that deck, vapor/moisture barrier completion, water-tightness, installation tolerances, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

B. Examine substrates for compliance with requirements for substrates.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

3.03 INSTALLATION

A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION

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SECTION 07 7123
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Prefinished Aluminum-zinc alloy coated steel gutters and downspouts.

B. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 07 6200 - Sheet Metal Flashing and Trim.

C. Section 07 7100 - Roof Specialties.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A792 / A792M - 09a Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

B. Comply with applicable code for size and method of rain water discharge.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on prefabricated components.

C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pre-Finished Aluminum-zinc alloy coated steel: ASTM A792, 55% Aluminum, 43.5% Zinc, 1.5% Silicon Coating ("Galvalume"). Thickness to comply with SMACNA guidelines, 24 gauge minimum.

B. Primer: Zinc molybdate type.

C. Protective Backing Paint: Zinc molybdate alkyd.

D. Color: Architect to select from manufacturer's full range of preimum colors.

2.02 COMPONENTS

A. Gutters and Conductor Head

1. Gutters: Profile as indicated; size as indicated.
2. Conductor Head: Profile as indicated; size as indicated. Include overflow protection vent.

B. Downspouts: Plain rectangular profile; size as indicated.

C. Splash Guards: Inside corner and straight valley guards, of same material as gutters. 3" tall and 16" each direction from corner, or center, of guard.

D. Anchors and Supports: Profiled to suit gutters and downspouts.
1. Anchoring Devices: Type recommended by fabricator.
2. Gutter Supports: Straps, unless indicated otherwise.
3. Downspout Supports: Brackets, unless indicated otherwise.
   a. Provide minimum of 3 locations: top, middle and bottom, unless fabricator or SMACNA recommends more. Maximum spacing 10 feet.
4. Material: Same material as gutters and downspouts, unless fabricator recommends otherwise.

E. Fasteners: Same material and finish as gutters and downspouts , unless fabricator recommends otherwise.

F. Gutter dropouts at each downspout location. Filter screen shall be installed at each downspout location.

2.03 ACCESSORIES

A. Splash Pads on roof: Built up roof membrane as recommended by roof manufacturer

2.04 FABRICATION

A. Form gutters and downspouts of profiles and size indicated.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Provide expansion joints as recommended by SMACNA guidelines, and in locations that will not hinder drainage.

E. Hem exposed edges of metal.

F. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

A. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as selected from manufacturer's standard colors (Full range of preimum colors).

B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions, or industry standards (see Reference Standards above).

B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

D. Install splash guards on gutters at bottom of all valleys, in accordance with manufacturer's directions.

E. Set splash pads under downspouts on roof.

END OF SECTION

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SECTION 07 7200
ROOF ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Roof hatches, manual and automatic operation, including smoke vents, non-fire rated.

B. Alternating Tread Ladder

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

B. Section 05 5000 - Metal Fabrications: Shop fabricated steel items.

C. Section 07 5200 - Motified Bituminous Membrane Roofing

D. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.

E. Section 07 7100 - Roof Specialties: Other manufactured roof items.

F. Section 07 7123 - Manufactured Gutters and Downspouts.

1.03 REFERENCE STANDARDS

A. 29 CFR 1910.23 - Ladders; Current Edition.

B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices; Current Edition.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

I. FM (AG) - FM Approval Guide; Current Edition.

J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2025.

K. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.

D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.06 WARRANTY

A. See Section 01 7800 - 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 ROOF HATCHES, MANUAL AND AUTOMATIC OPERATION

A. Roof Hatch Manufacturers:
   1. Basis of Design: Bilco Company; Roof Hatch: www.bilco.com.
   2. Basis of Design for Alternating Tread Ladder; Lapeyre Stair: https://www.lapeyrestair.com/products/
   3. Other Acceptable Manufacturers:
      a. Acudor Products Inc: www.acudor.com.
      b. Nystrom, Inc: www.nystrom.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Roof Hatches: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Non - Fire Rated.
   3. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   4. For Alternating Tread Ladder Access: See drawings.

C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
   1. Material: Mill finished aluminum, 11 gage, 0.0907 inch thick.
   2. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
   3. Curb Height: 12 inches from finished surface of roof, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.
   1. Capable of supporting 40 psf live load.
   2. Material: Mill finished aluminum; outer cover 11 gage, 0.0907 inch thick, liner 0.04 inch thick.
   3. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
   4. Gasket: Neoprene, continuous around cover perimeter.

E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
   1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
   2. Hinges: Heavy duty pintle type.

3. Hold open arm with vinyl-coated handle for manual release.
4. Latch: Upon closing, engage latch automatically and reset manual release.
5. Manual Release: Pull handle on interior.
6. Locking: Padlock hasp on interior.

PART 3 - EXECUTION

3.01 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.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 07 8400
FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Work described in this Section includes:
   1. Through penetration firestopping in fire rated construction.
   2. Construction-gap firestopping at connections of the same materials and different materials in fire rated construction.
   3. Construction-gap fire stopping occurring within fire rated wall, floor, floor-ceiling, and/or roof-ceiling assemblies.
   4. Construction-gap firestopping at the top of fire rated walls.
   5. Through-penetration smoke-stopping in smoke partitions.
   6. Construction-gap smoke-stopping in smoke partitions.

B. Related work Specified elsewhere includes:
   1. For structural, finish, and fire protection materials: Refer to the appropriate Specifications Sections.
   2. Fire dampers and manufactured devices: Refer to Divisions 21-23.
   3. Raceway seals and manufactured electrical devices: Refer to Division 26.

C. Unless specifically indicated otherwise, the party, trade, or subcontractor whose work penetrates fire-rated construction and/or fire-rated assemblies, shall be responsible for firestopping around their own penetrations.

D. In the event the General Contractor employs a Specialty Subcontractor for the required firestopping work, they shall notify all prospective Bidders, so as to avoid duplication in pricing.
   1. The Specialty Subcontractor shall provide coordination of requirements and the related work of other trades in advance of and as the Work progresses.

1.03 REFERENCED STANDARDS

A. Underwriters Laboratories - U.L. Fire Resistant Directory:
   1. Through-penetration fire stop devices (XHCR); Firestop Devices (XHJI).
   2. Fire resistant ratings (BXUV) (BXRH).
   3. Through-penetration firestop systems (XHEZ).
   4. Fill, void, or cavity material (XHHW).
   5. Joint Systems (XHBN) & Perimeter Fire Containment Systems (XHDG).

B. American Society for Testing and Materials Standards:
   1. ASTM E 814: Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
   2. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
   3. ASTM E 1966: Standard Test Method for Fire Resistive Joints Systems.
   4. ASTM E 2307: (Perimeter).

C. Underwriters Laboratories, Inc.:
   1. UL 1479: Fire Tests of Through-Penetration Firestops.
   2. UL 2079: Tests for Fire Resistance of Building Joint Systems.
   3. UL 723: Surface Burning Characteristics of Building Materials.

D. NFPA 101 - Life Safety Code / NFPA 70 - National Electrical Code.

1.04 DEFINITIONS

A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.

B. Barriers: Time rated fire walls, smoke barrier walls, time rated floor-ceiling and roof-ceiling assemblies, and structural floors and walls.

C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses, and smoke.

D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.

E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.

F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc., to close specific barrier penetrations.

G. Sleeve: Metal fabrication or metal pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.05 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Fire Rated Construction: Maintain barrier and structural floor fire ratings including resistance to cold smoke at all penetrations, connections with other surfaces and/or types of construction, at separations required to permit building movement and sound and/or vibration absorption, and at other construction gaps.
   2. Smoke Barrier Construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound and/or vibration absorption, and at other construction gaps.

1.06 SUBMITTALS

A. Submit in accordance with General Conditions, and Division 1, unless specifically indicated otherwise.

B. Product Data: Manufacturer’s written specifications and technical data including the following:
   1. Detailed specifications of construction and fabrication.
   2. Manufacturer’s current written installation instructions.
   3. Summary of test data for each product intended for use and limitations. Include name and address of the required independent testing laboratory and compliances obtained.

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. Details of each proposed assembly identifying intended products and applicable UL System number or UL Classified devices.
   2. Manufacturer or manufacturers representative shall provide qualified engineering judgments and drawings relating to non-standard applications as needed.

D. Quality Control Submittals: Statement of qualifications.

E. Applicators’ Qualifications Statement: List past projects indicating required experience.

1.07 QUALITY ASSURANCE

A. Specialty Contractor's Qualifications: Firm experience in installation or application of systems similar in complexity to those required for this project, plus the following:
   1. Acceptable to or licensed by manufacturer, and to State, Local, and/or other authority having jurisdiction, where applicable.
   2. At least 2-years experience with systems intended for use.
   3. Successfully completed at least five projects of similar size, scope, and complexity using the systems intended for use.

B. Local and State Regulatory Requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System Numbers or UL classified devices and/or systems. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.08 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping:
   1. Deliver products in original unopened packaging with legible manufacturer's identification.
   2. Coordinate delivery with scheduled installation date, so as to allow minimum storage at site.

B. Storage and Protection: Store materials in a clean, dry, ventilated interior location. Store materials off of floor, and protect from soiling, abuse, moisture, and freezing. Follow manufacturer's written instructions when more stringent.

C. Remove damaged and/or contaminated materials immediately, legally dispose of off site, and Replace, at Contractor's expense.

1.09 PROJECT CONDITIONS

A. Existing Conditions:
   1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding with work.
   2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.

B. Environmental Requirements:
   1. Furnish adequate ventilation if using solvents.
   2. Furnish forced air ventilation during installation if required by manufacturer and/or authorities having jurisdiction.
   3. Keep Flammable materials away from sparks or flame.
   4. Provide masking or drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
   5. Comply with manufacturer's written recommendations for temperature and humidity conditions before, during, and after installation of firestopping.

1.10 GUARANTEE

A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fail in joint adhesion, co-adhesion, abrasive resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, and/or general durability, and/or which appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality or characteristic of the material for the exposure indicated. The guarantee period shall be for 1-year from the date of "Substantial Completion."

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS

A. Use only those listed in the UL Fire Resistance Directory for the UL System involved.

B. Products shall be as manufactured by one of the following , or pre-approved equivalent:
   1. Dow Corning.
   2. HILTI.
   3. 3M Fire Protection Products.
   4. Nelson Firestop Products.
   5. Rector Seal Corp.; "Bio Fireshield", "Biostop", "Biotherm", "Metacaulk", "Track-Safe", [Basis of Design]: www.rectorseal.com.
   6. Specified Technologies, Inc.
   7. Tremco, Div. of RPM Corporation.

C. All firestopping products must be from a single manufacturer.

D. All trades shall use products from the same manufacturer.

2.02 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR (XHJI) and XHEZ may be used, providing that they conform to the construction type, penetrant type, annular space requirements, and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.
   1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designated to perform this function.

2.03 CONSTRUCTION-GAP FIRE STOPPING OF FIRE-RATED CONSTRUCTION

A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.

B. Firestopping at construction gaps between tops of partitions and under side of structural systems.

C. Firestopping at construction gaps between tops of partitions and underside of fire-rated ceiling or ceiling assembly.

D. Firestopping of control joints in fire rated masonry partitions.

E. Firestopping expansion joints.

F. Acceptable manufacturers and products: Use only those listed in the UL Fire Resistant Directory for the UL System involved.

2.04 SMOKE STOPPING AT SMOKE PARTITIONS

A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration firestopping in fire-rated construction, as specified in the “Referenced Standards” is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded, as applicable.

B. Construction-gap smoke-stopping: Any system complying with the requirement for construction-gap firestopping in fire-rated construction, as specified in the “Referenced Standards” is acceptable, provided that the system includes the specified smoke seal or will provide the smoke seal. The length of time of the fire resistance may be disregarded, as applicable.

2.05 ACCESSORIES

A. Fill, void, and cavity materials: As classified under category XHHW in the UL Fire Resistance Directory.

B. Forming materials: As classified under category XHKU in the UL Fire Resistance Directory.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion. Notify the General Contractor of such conditions.
   1. Verify barrier penetrations are properly sized and in suitable conditions for application of materials.
   2. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 PREPARATION AND CLEANING

A. Clean surfaces to be in contact with penetration seal materials, of dirt, grease, oil, loose materials, rust or other substances, that may effect proper fitting, adhesion, or the required fire resistance.

3.03 INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer’s written instructions and recommendations.

B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Where floor openings without penetrating items are more than 4-inches in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as required for floor system.

D. Protect materials from damage on surfaces subject to traffic.

E. Place firestopping in annular space around fire dampers before installation of damper’s anchoring flanges, which are to be installed in accordance with fire damper manufacturer’s written recommendations, unless specifically indicated otherwise.

F. Where large openings are created in walls, or floors to permit installation of pipes, ducts, cable tray, bus duct, or other items, close unused portions of opening with firestopping material tested for the application.

G. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, provide vertical, 12-inch wide fiber dams for full thickness and height of air cavity at maximum intervals of 15'-0" on center.

3.04 FIELD QUALITY CONTROL

A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by the Architect, building inspector, fire inspector, and/or other authority having jurisdiction.

C. Perform under this Section patching and repairing of firestopping caused by cutting or penetration by other trades, and/or by any other cause.

3.05 ADJUSTING AND CLEANING

A. Immediately clean-up spills of liquid components.

B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged and clean condition.

D. Legally dispose of excess materials, trash, debris, etc., off of site.

END OF SECTION

SECTION 07 9010
JOINT SEALERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Exterior Silicone and Polyurethane Sealants.
2. Exterior and Interior Polyurethane Traffic Sealants.
3. Interior Silicone and Polyurethane Sealants.
4. Interior Latex Joint Sealers.
5. Metal lap joint sealants.
6. Threshold and sheet metal bedding sealants.
7. Acoustic Sealant.
8. Joint Accessories.

1.02 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. Related work specified elsewhere includes:
1. Section 01400 - Quality Requirements: General requirements for mock-ups.
2. Section 03 3000 - Concrete.
3. Section 04 2000 - Unit Masonry Assemblies.
4. Section 07 1400 - Fluid-Applied Air Barrier: Sealants required in conjunction with substrates for fluid-applied waterproofing.
5. Section 07 6200 - Sheet Metal Flashing and Trim.
6. Division 8 - Doors and Windows.
7. Section 08 8000 - Glazing: Glazing sealants and protective glazing systems.
8. Section 09 2116 - Gypsum Board Assemblies.
9. Section 09 3000 - Tile.
10. Section 09 5100 - Suspended Acoustical Ceilings.
11. Section 09 9100 - Paints and Coatings.
12. Divisions 15 and 16 - (Joint sealers for mechanical and electrical work)

1.03 REFERENCE STANDARDS

A. ASTM C 510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.

B. ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

C. ASTM C 794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

D. ASTM C834 - Standard Specification for Latex Sealants.

E. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

F. ASTM C 1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

G. ASTM C 1193 - Standard Guide for Use of Joint Sealants.

H. ASTM C 1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.

I. ASTM C 1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.

J. ASTM C 1311 - Standard Specification for Solvent Release Sealants.

K. ASTM D 2203 - Standard Test Method for Staining from Sealants.

1.04 DESCRIPTION OF WORK

A. Work described in this section includes joint sealer systems.

1.05 SYSTEM PERFORMANCES

A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.06 SUBMITTALS

A. Product Data: Submit manufacturer's complete product specifications, handling/installation/curing instructions, color charts and performance tested data sheets and field / lab results for each product required.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has successfully completed within the last three years at least 3 joint sealer applications similar in type and size to that of this project and who will assign mechanics from these earlier applications to this project, of which one will serve as lead mechanic.

B. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

C. Mock-Up:
   1. As indicated on drawings.
   2. Coordinate with work of other Sections.
   3. Locate where directed.
   4. Mock-up may not remain as part of the Work.

1.08 DELIVER, STORAGE AND HANDLING

A. Deliver materials to project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.

B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.09 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
   1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 degrees F.
   2. When joint substrates are wet due to rain, frost, condensation or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.

B. Colors: Provide color of exposed joint sealers indicated, or if not indicated, as selected by Architect from manufacturer's full range of custom colors.

2.02 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

B. Multi-Part Nonsag Urethane Sealant: Type M, Grade NS, Class 25, Uses NT, M, A and, as applicable to joint substrates indicated, O.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. "Dynatrol 11" One-part; Pecora Corp.
      b. "Sonolastic NP-2" Multi-component; Sonneborn.
      c. "Dymeric 240/240FC" Multi-component; Tremco, Inc.
   2. Locations for Use: Exterior joints and penetrations in vertical surfaces of concrete, and between metal and concrete, mortar or stone; overhead or ceiling joints; perimeters of metal frames in exterior walls; vertical expansion and control joints in masonry and concrete; and at all miscellaneous locations requiring a joint sealant.
   3. Equivalent 1-part sealants will be acceptable for interior surfaces only, by one of the above named manufacturers.

C. Two-Part Pourable Urethane Sealant (Horizontal): Type M, Grade P, Class 25; Uses T, M, A and, as applicable to joint substrates indicated, O.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. "Vulkem 45SSL"; Tremco, Inc.
      b. "Pourthane"; W. R. Meadows, Inc.
      c. "NR-200 Urexpan"; Pecora Corp.
      d. "Sonolastic Paving Joint Sealant"; BASF Building Products Div.,
      e. "THC-900/901"; Tremco, Inc.
   2. Locations for Use: Exterior and interior expansion, control and construction joints in horizontal surfaces; and joints subject to pedestrian and light vehicular traffic.
   3. Equivalent 1-part sealants will be acceptable for joints in exterior concrete paving only by one of the above named manufacturers.

D. One-Part Mildew-Resistant Silicone Sealant: Type S, Grade NS; Class 25, Uses NT, G, A and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide for sealing interior joints with nonporous substrates around ceramic tile, showers, sinks and plumbing fixtures.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. "Dow-Corning 786"; Dow Corning Corp.
      b. "SCS 1702"; General Electric.
      c. "863 #345 White"; Pecora Corp.
      d. "Tremsil 200"; White, Clear; Tremco, Inc.
   2. Locations for Use: Interior joints in vertical surfaces and terminal edges of tile; showers, baths, and joints at damp areas, such as around sinks and plumbing fixtures and pipe penetrations; and exposed terminal edges of vinyl flooring, such as around door frames and terminations at concrete.

E. Pre-Compressed Polyurethane Foam Sealant: Tremco "illmod 600": Expandable sealant for use between CMU wall and a floor slab, and at other similar locations or where noted. Color: black.

F. Expansion (High Movement) Joint Sealants: One part, neutral cure silicone material: Dow Corning 790 Silicone Building Sealant, or Tremco, Inc. Spectrem 1, Spectrem 3, Spectrem 4 TS (Tintable System). Type S, Grade NS, Class +/- 50. Uses NT, M, G, O.

G. Masonry:
   1. Silicone, non-staining, neutral curing:

a. "Spectrem 1", "Spectrem 3", or "Spectrem 4-TS" - Tintable System; Tremco, Inc.
b. Dow "790".
c. Pecora "890".

2.03 LATEX JOINT SEALERS

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part nonsag, acrylic, mildew resistant, acrylic emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior and on protected exterior exposures involving joint movement of not more than + 7.5%.
1. Products: Subject to compliance with requirements, provide with one of the following:
a. "Chem-Calk 600"; Bostik Construction Products Div.
b. "AC-20"; Pecora Corp.
c. "Sonolac"; Sonneborn Building Products Div; Rexnord Chemical Prod., Inc.
d. "Tremflex 834"; Tremco Inc.
2. Locations for Use: Interior joints in field-painted vertical and overhead surfaces at perimeter of metal door frames, gypsum drywall, plaster and concrete or concrete masonry; and all other interior locations not indicated otherwise.

2.04 ACOUSTIC SEALANT

A. Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
1. Applications: Use for concealed locations only:
a. Sealant bead between top stud runner and structure and between bottom stud track and floor.

2.05 FIRE-RESISTANT JOINT SEALERS

A. Refer to Section 07 8400 - "Firestopping," for additional information and detailed requirements.

2.06 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint-Fillers:
1. Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Backer Rod: Premium grade, closed cell polyethylene foam rod; Sealtight Backer Rod, as manufactured by W.R. Meadows, Inc., or approved equivalent.
3. Joint Filler: "Ceramar" flexible foam expansion joint filler, as manufactured by W.R. Meadows, Inc., or approved equivalent.
a. Thickness: 1/4".

C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint. Provide self-adhesive tape where applicable.

2.07 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surface adjacent to joints.

D. Expansion Joint Filler: Multi-purpose, Expansion-Contraction Joint Filler for slab joints. Thickness: 1/2 inch, unless indicated otherwise. Equal to W.R.Meadows Fibre Expansion Joint.

PART 3 - EXECUTION

3.01 INSPECTION

A. Require Installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Obtain Installer's written report listing any conditions detrimental to performance of joint sealer work. Do not allow joint sealer work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
   1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellents; water; surface dirt and frost.
   2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
   3. Remove laitance and form release agents from concrete.
   4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Perform field sealant adhesion testing prior to beginning work to verify substrate preparation and priming requirements.

3.03 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. Installation of Sealant Backings:
   1. Install sealant backings to comply with the following requirements:

2. Install joint-fillers of type indicated or recommended by sealant manufacturer to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
   a. Do not leave gaps between ends of joint-fillers.
   b. Do not stretch, twist, puncture or tear joint-fillers.
   c. Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.
3. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where required to prevent third-side adhesion of sealant to back of joint.

E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

F. Perform acoustical sealant application work in accordance with ASTM C 919.

G. Tooling of Nonsag Sealants:
1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
2. Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.04 PROTECTION AND CLEANING

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

END OF SECTION

SECTION 07 9100
PREFORMED JOINT SEALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precompressed foam seals.

B. Compression gaskets.

C. Preformed strip seals.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

B. Section 07 9200 - Joint Sealants: Liquid and mastic joint sealants and their backing materials.

1.03 REFERENCE STANDARDS

A. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's technical data sheets for each product, including chemical composition, movement capability, color availability, limitations on application, and installation instructions.

C. Color Cards: For color selection.

D. Samples for Color Selection: 4 inch long pieces of each color available; at least 2 samples of each color.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

1.05 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 in this section with at least three years of documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a two year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealers that fail to achieve watertight seal or exhibit loss of adhesion or cohesion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Precompressed Foam Seals:
   1. Balco, Inc; Wall Compression Seals (BCSW): www.balcousa.com/#sle.
   2. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
   3. Nystrom, Inc: www.nystrom.com/#sle.
   4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
   5. Watson Bowman Acme Corporation: www.watsonbowmanacme.com/#sle.

2.02 PRECOMPRESSED FOAM SEALS

A. Precompressed Foam Seal: Comprised of urethane, modified-acrylic impregnated, or closed-cell neoprene foam impregnated with water-repellent, and with self-adhesive faces protected prior to installation by release paper.
   1. Color: As selected by Architectfrom full range of premium colors.
   2. Size as required to provide water-tight seal when installed.
   3. Calculate size according to manufacturer's recommendations.
   4. Measure size of existing joints before selecting seal width.
   5. Provide product recommended by manufacturer for traffic-bearing use.
   6. Applications:
      a. Exterior wall expansion joints.
   7. Manufacturers:
      a. EMSEAL Joint Systems, Ltd; DSM System: www.emseal.com/#sle.
      b. Tremco Commercial Sealants & Waterproofing; ExoAir Eco: www.tremcosealants.com/#sle.
      c. Watson Bowman Acme Corporation; Wabo InverSeal (IV): www.watsonbowmanacme.com/#sle.

B. Precompressed Foam Seal, Fire-Retardant Impregnated: Comprised of waterproof silicone faces on each side of fire-retardant impregnated foam sealant.
   1. Color: As selected by Architect.
   2. Size as required to provide water-tight seal when installed.
   3. Calculate size according to manufacturer's recommendations.
   4. Fire-Rating: As indicated on drawings, comply with UL 2079.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive this work.

B. Measure joint dimensions and verify that seal products are of the correct size to properly seal the joints.

3.02 PREPARATION

A. Properly prepare construction components adjacent to the work of this section to prevent damage and disfigurement due to this work.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written instructions.

B. Precompressed Foam Seals:
   1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
   2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
   3. Remove loose materials and foreign matter that could impair adhesion of sealant.
   4. Do not stretch precompressed seal; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

C. Compression Gaskets:
   1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
   2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
   3. Remove loose materials and foreign matter that could impair adhesion of sealant.

4. Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect joints from damage until adhesives have properly cured.

END OF SECTION

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SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, and ceiling surfaces.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 03 3100 - Concrete.

C. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.

D. Section 05 5000 - Metal Fabrications: Custom fabricated metal expansion and control joint devices.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Roof expansion and control joint covers.

F. Section 07 9005 - Joint Sealers: Expansion and control joint finishing utilizing a sealant and bond breaker.

G. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

H. Section 09 5100 - Acoustical Ceilings: Expansion joint assemblies in suspended ceiling grids.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

D. Samples: Submit two samples 6 inch long, illustrating profile, dimension, color, and finish selected.

E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

F. LEED Submittals:
   1. For joint cover assemblies, submit documentation of recycled content and location of manufacture.
   2. For steel products, submit documentation of steel mill process, location of mill and location of manufacture.

1.05 QUALITY REQUIREMENTS

A. Installer Qualifications: Approved by manufacturer.

B. 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.

C. Manufacturer shall provide 5 year warranty for all joint covers.

PART 2 - PRODUCTS

2.01 MANUFACTURERS / PRODUCTS

A. Expansion Joint Cover Assemblies:
   1. Architectural Art Mfg, Inc: www.archart.com/#sle.
   2. Balco, Inc.: www.balcousa.com.
   3. Construction Specialties, Inc: www.c-sgroup.com/#sle. (BASIS OF DESIGN)
      a. Floor, Interior: Monoflex
      b. Wall to Wall, Exterior: VF / VFR / HFR
      c. Wall to Wall, and Ceiling to Ceiling: Interior face of Exterior and Interior Wall and Ceilng: ASM
      d. Interior Corner Wall: ASM
   4. Inpro: www.inprocorp.com.
   5. MM Systems Corp; _____: www.mmsystemscorp.com/#sle.
   6. Nystrom, Inc; _____: www.nystrom.com/#sle.
   7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.

B. Resilient Filler: Neoprene, exhibiting Shore A hardness of 40 to 50 Durometer.

C. Threaded Fasteners: Stainless steel.

D. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

2.04 FABRICATION

A. Joint Covers: Aluminum cover plate, aluminum frame construction, retainers with resilient neoprene filler strip, designed to permit plus or minus 50 percent joint movement with full recovery, flush mounted.

B. Back paint components in contact with cementitious materials.

C. Galvanize embedded ferrous metal anchors and fastening devices.

D. Shop assemble components and package with anchors and fittings.

E. Provide joint components in single length wherever practical. Minimize site splicing.

F. Provide with stainless steel foil insulation for fire barrier as needed to achieve fire-rating where required.

2.05 FINISHES

A. Floors: Mill finish.

B. Walls and Ceilings: Clear anodized.

C. Seal Material: Color as selected by Architect from manufacturer's standard range.

D. Resilient Filler Exposed to View: Gray.

E. Exterior Walls to Wall: Color as selected for Silicone coating.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.02 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION

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SECTION 08 1113
STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Hollow metal borrowed lites glazing frames.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 08 7100 - Door Hardware.

C. Section 09 9100 - Painting: Field painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2026.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

J. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

K. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

M. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

N. ITS (DIR) - Directory of Listed Products; Current Edition.

O. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2024.

Q. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.

R. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

S. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

T. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

U. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

V. UL (DIR) - Online Certifications Directory; Current Edition.

W. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any. Show anchorage and accessory items.

D. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

E. Coordinate glazing frames and stops with glass and glazing requirements.

F. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

G. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Provide doors and frames complying with Steel Door Institute “Recommended Specifications: Standard Steel Doors and Frames” (SDI-100) and as herein specified.

C. Provide steel doors and frames from a single manufacturer.

D. Fire-Rated Door Assemblies:
   1. Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 “Standard for Fire Doors and Windows,” and have been tested, listed and labeled in accordance with ASTM E 152 “Standard Methods of Fire Tests of Door Assemblies” by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.
   2. Labels mounted on doors and door frames must indicate the time rating of the door/frame assembly.
   3. Provide units listed and labeled by UL.
   4. Attach fire rating label to each fire-rated unit.
   5. Fire rating label must be accessible, permanent (embossed on metal label), and be kept legible at all times.
   6. Labels on frames with transoms or sidelights must identify that the opening assembly includes same.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

C. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage.

D. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equivalent in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

E. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames, (General):
   1. Ceco Door: www.cecodoor.com.
   2. Curries, Mason City, Iowa: www.curries.com.
   3. Mesker Industries, Inc.
   4. Republic Builders Products Corp./Subs. Republic Steel.

B. Substitutions: Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
   4. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   5. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
      a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. Materials:
   1. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
   2. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM SA 568.
   3. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G90 zinc coating, mill phosphatized.
   4. Supports and Anchors: Fabricate of galvanized sheet steel of gage not less than that of door frame.

5. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

C. Fabrication:
1. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site.
2. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
3. Fabricate exterior doors, panels and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gauge inverted steel channels.
   a. Use galvanizing repair paint for surfaces damaged by fabrication or welding.
4. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.
5. Finish Hardware Preparation:
   a. Prepare doors and frames to receive mortise and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115 series specifications for door and frame preparation for hardware.
   b. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
   c. Locate finish hardware as indicated on final shop drawings, or if not indicated, in accordance with “Recommended Locations for Builders' Hardware,” published by Door and Hardware Institute.
6. Shop Painting:
   a. Clean, treat and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
   b. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before application of paint.
   c. Use galvanizing repair paint for surfaces damaged by fabrication or welding, prior to prime coat.
   d. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.
   e. Do not paint fire labels on doors or frames.

D. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Provide metal doors of types and styles indicated on drawings or schedules, or seamless hollow steel construction. Form exterior doors of hot dip galvanized steel.

B. Exterior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 3 - Extra Heavy-duty.
   b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
   c. Model 1 - Full Flush.

d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
2. Core Material: Polystyrene, 1 lbs/cu ft minimum density.
3. Top Closures for Outswinging Doors: Flush with top of faces and edges.
4. Door Face Sheets: Flush.

C. Exterior Doors, Fire-Rated:
1. Grade: ANSI A250.8 - SDI-100; Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 1 - Full Flush.
2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
a. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
b. Attach fire rating label to each fire rated unit.
3. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
4. Core: Mineral board.
5. Thickness: 1-3/4 inch.
6. Top Closures : Flush with top of faces and edges.
7. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
8. Texture: Smooth faces.

D. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inches, nominal.

E. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
b. Attach fire rating label to each fire rated unit.
3. Core Material: Mineral board.
4. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. General:
1. Comply with the requirements of grade specified for corresponding door.
a. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricated frames of minimum 16-gauge cold-rolled furniture steel for interior door frames; 14-gauge cold-rolled furniture steel for exterior door frames.

1) Frames for doors 7'-10" or more in height and/or over 3'-5" in width: 14 gauge cold-rolled furniture steel, and one additional hinge, whether or not indicated in hardware schedule.

2. Frames shall be formed by press brake with corners sharp and true. Corners shall be mitered and accurately fitted, and shall be fully electrically welded and then ground smooth. Removable spreaders shall be welded to the bottom of the frame. Frames shall be accurately mortised for hardware.
3. Contractor shall verify width of throat opening required, before fabrication.
4. A minimum of three wall anchors shall be provided at each jamb, except four at doors 7'-10" high or more, and six at doors 10-foot high or more. Anchors shall be attached to door frames, adjustable, suitable for wall conditions and job requirements, and shall be 16 gauge minimum. Floor anchors shall be provided and welded to foot of each jamb with two 5/16" holes for securing to the floor.
5. Reinforcements of adequate gauge shall be provided for strikes, closers and brackets and other surface applied hardware for field drilling and tapping.

C. Exterior Door Frames: Fully welded type.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Frame Finish: Factory primed and field finished.
3. Weatherstripping: Separate, see Section 08 7100.

D. Interior Door Frames: Fully welded type.
1. Frame Finish: Factory primed and field finished.

E. Interior Door Frames, Fire-Rated: Fully welded type.
1. Fire Rating: Same as door, labeled.
2. Frame Finish: Factory primed and field finished.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

I. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Glazing: As specified in Section 08 8000 - Glazing.

B. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
1. Provide additional door silencers at doors over 3'-0" wide or 7'-0" in height.
2. Provide silencers equivalent to "GJ64" silencers as manufactured by Glenn-Johnson Corp., for metal frames, when not provided under the work of Section 08 7100 - "Finish Hardware."

D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. General: Install standard steel doors, frames and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.

B. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

C. Install fire rated units in accordance with NFPA 80.

D. Coordinate frame anchor placement with wall construction.

E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

F. Placing Frames:
   1. Comply with provisions of SDI-1-06 “Recommended Erection Instructions for Steel Frames,” unless otherwise indicated.
   2. Remove before installation all spreader bars and braces used for shipping.
   3. Except for frames located at in-place concrete or masonry, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces leaving surfaces smooth and undamaged.
   4. In masonry construction, locate a minimum of 3 wall anchors per jamb at hinge and strike levels. Add 1 wall anchor per jamb at hinge and strike levels for each whole 1'-10" height increment over 6'-0"; Similar at glazed and cased openings.
   5. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.
   6. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. Attach wall anchors to studs with tapping screws. Add additional anchors as indicated in paragraphs above.
   7. Install fire-rated frames in accordance with NFPA Std. No. 80

G. Door Installation:
   1. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
   2. Place fire-rated doors with clearances as specified in NFPA Std. No. 80.

H. Install silencers after all painting of doors and frames has been completed.

I. Install door hardware as specified in Section 08 7100.

J. Comply with glazing installation requirements of Section 08 8000.

K. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Prime Coat Touch-up:
   1. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
   2. Use galvanizing repair paint for galvanized surfaces, prior to prime coat.

C. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

D. Repair all dents, bends, and prying prior to painting.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 04 2000 - Unit Masonry: Masonry construction to receive door frames.

C. Section 06 2000 - Finish Carpentry: Wood trim and molding associated with flush wod doors.

D. Section 08 1113 - Steel Doors and Frames: Steel door frames to receive wood doors.

E. Section 08 4313 - Aluminum Framed Storefronts: Interior aluminum framed storefronts to receive wood doors.

F. Section 08 7100 - Finish Hardware.

G. Section 08 8000 - Glazing.

H. Section 09 2116 - Gypsum Board Assemblies: Framing and wall assemblies to receive door frames.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI A135.4 - Basic Hardboard; 2012 (Reaffirmed 2020).

C. ANSI A208.1 - American National Standard for Particleboard; 2022.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

I. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings; 2025a.

J. ASTM E413 - Classification for Rating Sound Insulation; 2022.

K. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2023.

L. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.

M. AWI (QCP) - Quality Certification Program; Current Edition.

N. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

O. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

P. BHMA A156.13 - Mortise Locks and Latches; 2022.

Q. FM (AG) - FM Approval Guide; Current Edition.

R. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

S. ITS (DIR) - Directory of Listed Products; Current Edition.

T. AWS (AWI/AWMAC/WI) Architectural Woodwork Standards, 2nd Edition; 2014.

U. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

V. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

W. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

X. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

Y. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

Z. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing and louvers.

D. Samples: Submit two samples of stain colors, 6 x 6 inches minimum - on actual veneer chosen, for Architect to use to select stain color.

E. Verification Samples: Submit two samples of door veneer, minimum 24 x 24 inches in size illustrating wood grain, stain color, and sheen.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than FIVE (5) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than five (5) years of documented experience.

C. Installed Fire-Rated Door Assembly: Comply with fire-rating as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Eggers Industries: www.eggersindustries.com/#sle.
   2. Haley Brothers: www.haleybros.com/#sle.

3. Marshfield-Algoma: www.marshfielddoors.com.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS

A. General: See drawings for locations and additional requirements.
   1. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location, _____.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
      a. Labeling of Fire Doors:
         1) Attach fire rating label to each fire rated unit.
         2) Fire rating label must be accessible, permanent (embossed on metal label), kept legible at all times, and shall contain the fire resistance rating in hours and/or minutes.
   3. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), 5-plies, and faces as indicated.

B. Fire Rated Doors if shown: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White oak, veneer grade in accordance with quality standard indicated, quarter cut, with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Any option allowed by quality standard for grade.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Stain: Manufacturer to include full range of Standard and custom stains
      c. Sheen: Satin.

B. Factory finish doors in accordance with specified quality standard:
   1. Transparent Finish: Transparent catalyzed polyurethane, Premium quality, minimal sheen.
   2. Stain color shall be custom stain color as selected by Architect.

2.07 LIGHT FRAMES

A. Factory Glazing: Refer to Section 08 8000 - Glazing for glass view panels in flush wood doors. Factory install glass in fire rated doors only. Fill glazing bead nail holes in factory finished doors.

B. Wood Glass Stops (Beads) for Light Openings in Wood Doors: Provide manufacturer's standard flush wood beads unless otherwise indicated.
   1. Wood Species: Same species as door faces.
   2. Profile: Flush rectangular beads.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips as required and approved for such use.
   4. Fill glazing bead (stops) nail holes after glass has been installed - fill to match door color.

C. Wood Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered non-combustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated. Profile per Marshfield Veneer Clad Light Bead, matching non-rated W-6 profile.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Install door louvers plumb and level.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Access door and frame units, fire-rated and non-fire-rated, in wall and ceiling locations.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 07 9005 - Joint Sealers.

C. Section 09 2116 - Gypsum Board Assemblies: Openings in gypsum ceilings or partitions.

D. Section 09 9100 - Painting: Field paint finish.

E. Divisions 22-26 Sections: Additional access doors provided and installed by Contractors for Plumbing, Mechanical, Electrical and related work.

1.03 SUMMARY

A. This Section includes access doors for installation in the following types of new construction:
   1. Gypsum drywall.
   2. Unit masonry.
   3. As otherwise indicated.

B. Provide fire-rated access doors where indicated or scheduled, and at access openings in all walls of stairs, elevator shafts and equipment rooms, other shafts and plumbing chase walls which are partially or fully open through floors, and at walls and ceilings indicated or required by Code to be fire-rated.

1.04 REFERENCE STANDARDS

A. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
   1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

C. Shop Drawings: Indicate exact position of all access door units. Also indicate fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

E. Project Record Documents: Record actual locations of each access unit.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated access doors.
   1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.
   2. Provide products listed and labeled by UL as suitable for the purpose specified and indicated.

B. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.'s “Building Materials Directory” for rating shown.
   1. Provide UL label on each fire-rated access door.
   2. Fire rating label must be accessible, permanent (embossed on metal label), kept legible at all times, and shall contain the fire resistance rating in hours and/or minutes.

1.07 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.

B. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

C. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.08 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

B. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

C. Special-Size Access Doors: Use where required or requested; indicate on schedule.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Wall and Ceiling Access Doors:
   1. Acudor Products Inc: www.acudor.com.
   2. Bar-Co., Inc.
   3. Cesco Products
   4. J.L. Industries [Basis of Design]: www.activarcpg.com/jl-industries/.
   5. Karp Associates, Inc: www.karpinc.com.
   6. Larsens Manufacturing Co.
   7. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
   8. Nystrom: www.nystrom.com.
   9. The Williams Brothers Corp.
   10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.

2.03 MATERIALS AND FABRICATION: ACCESS DOOR UNITS - WALLS AND CEILINGS

A. Door and Frame Units: Formed steel.
   1. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.
   2. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
   3. Frames and flanges: 0.058 inch steel.

a. Fabricate frame with exposed flange, nominal 1-inch wide around perimeter of frame for units installed in the following construction:
   1) Exposed masonry.
   2) Exposed concrete.
   3) Exposed siding.
b. For gypsum drywall or gypsum veneer plaster, furnish perforated flange frames with drywall bead.
c. For full-bed plaster and E.I.F.S. applications, furnish frames with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

4. Door panels: 0.070-inch single thickness steel sheet.
   a. Painted Flush Panel Doors (non-fire-rated and fire-rated): Fabricate from not less than 16-gage galvanized sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
      1) Restore any damage to galvanized finish with cold-process galvanizing repair paint, prior to applying factory prime coating, or other finishes.
   b. Stainless Steel Flush Panel Doors: Fabricate from not less than 18-gage stainless steel sheet, with concealed spring hinges or concealed piano hinge set to open 175 degrees. Buff exposed surfaces to #4 satin finish, except where other finishes are indicated.
5. Size: As indicated or as necessary to access and service equipment.
6. Hardware:
   a. Hardware for Fire-Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   c. Hinge: 175 degree steel piano hinge with removable pin.
   d. Latch/Lock: Screw driver slot for quarter turn cam latch.
7. Galvanized, hot dipped finish, except where indicated otherwise.
8. Finish: No. 4 finish for stainless units.

B. Non-Fire Rated Door and Frame Units in Walls:
   1. Provide manufacturer's standard flush panel/door and frame.

C. Fire Rated Door and Frame Units in Walls:
   1. For fire rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

D. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.

E. Finishes:
   1. Exterior: 3-coat 70% resin “Kynar 500” finish (i.e.: 7-mil prime coat, 9-mil color coat, and 9-mil clear top coat) with minimum 2.4 mil total dry film thickness, in color to match adjacent finish where occurs, unless otherwise selected by Architect from manufacturer's standard non-metallic colors - 15 colors minimum to select from, including white.
      a. Soffit Locations: Color to match soffit material color selection, unless otherwise selected by Architect.
   2. Interior, Exposed to Normal View: To match finish on interior. Door "Finish Hardware" (refer to Section 08 7100), or if not indicated, to match existing hardware in room where occurs.
   3. Interior, in Service Areas, Above Ceilings, etc: Factory primed baked enamel.
   4. Toilet Rooms, Janitors Rooms, Kitchens, Kitchen Areas, Rooms Where Food is Stored, Prepared, Cooked and/or Served, and Break Rooms: Stainless steel, No. 4, satin finish.

2.04 FABRICATION

A. Weld, fill, and grind joints to ensure flush and square unit.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings in relation to adjacent finish surfaces. Secure rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

D. Coordinate installation with work of other trades.

E. Prepare perimeter of rough openings in concrete, CMU, and clay masonry with mortar/grout full-depth of wall and to size required; use pressure-treated wood as necessary for other concealed blocking, grounds, and supports at any stud wall construction.

3.03 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 3323
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Overhead coiling doors, operating hardware, interior, non-fire-rated, manual operation.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 04 4200 - Unit Masonry: CMU back-up walls to receive overhead door frames.

C. Section 05 1200 - Structural Steel: Support framing.

D. Sectino 05 5000 - Metal Fabrications: Steel guardrails associated with overhead doors.

E. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

F. Section 08 3700 - Glazed Aluminum Sectional Doors: other overhead doors.

G. Section 08 7100 - Door Hardware: Cylinder cores and keys.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM E2226 - Standard Practice for Application of Hose Stream; 2025.

E. FBC TAS 201 - Impact Test Procedures; Testing Application Standard; 1994.

F. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard; 1994.

G. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard; 1994.

H. ITS (DIR) - Directory of Listed Products; Current Edition.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

K. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

L. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

M. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

N. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

O. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general construction, component connections and details, electrical equipment.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Samples: Submit two slats, 12 inch in size illustrating shape, insulation, color and finish texture.

E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 WARRANTY

A. Provide manufacturer's standard two-year warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:
   1. Basis of Design: Overhead Door Corporation: www.overheaddoor.com.
   2. Other Acceptable Manufacturers:
      a. Cornell Iron Works, Inc.: www.cornelliron.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING DOORS

A. Non-Fire-Rated Interior Coiling Doors: Steel slat curtain, 26 gauge minimum, galvanized.
   1. Product: Model 600 "Coil Away" Rolling Service Door.
   2. Single Thickness slats.
   3. Finish: Powder coat finish: Minimum 25 standard colors (to be selected by Architect after bidding).
   4. Guides: Roll-formed shapes; galvanized steel.
   5. Hood Enclosure: Manufacturer's standard; galvanized steel.
   6. Torsion springs counterbalance mechanism.
   7. Bottom Bar: Extruded aluminum or Galvanized steel, with bottom seal.
   8. Manual operation:
      a. Push/Pull Handles: For push-up-operated doors, provide galvanized steel lifting handles on each side of door.
         1) Provide pull-down straps or pole hooks for doors more than 84-inches high.
   9. Lock: Locking bar; prepared to receive padlock supplied by others.
   10. Mounting: As indicated.

2.03 MATERIALS AND COMPONENTS

A. Metal Curtain Construction: Hinged slats.
   1. Slat Ends: Alternate slats fitted with nylon (or equivalent) end locks to act as wearing surface in guide, to prevent lateral movement, and to provide smooth, quiet operation.
   2. Curtain Bottom for Panel-Slat Curtains: Extruded aluminum.

B. Steel Slats: Minimum 26 gauge ASTM A 653/A 653M galvanized steel sheet (for interior sheets), unless recommended to be thicker by manufacturer.
   1. Superior performance powder coat finish, in color as selected by Architect.

C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.

1. Minimum thickness; 24 gage, 0.0239 inch.
2. Superior performance powder coat finish, in color as selected by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9200 - Joint Sealants.

F. Install enclosure and perimeter trim.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION

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SECTION 08 3700
GLAZED ALUMINUM SECTIONAL DOORS

GENERAL

1.01 SECTION INCLUDES

A. Glazed Aluminum Sectional Overhead Doors.

B. Electric Operators and Controls.

C. Operating Hardware, tracks, and support.

1.02 RELATED SECTIONS

A. Section 03 3000 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.

B. Section 04 8100 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

C. Section 05 5000 - Metal Fabrications: Steel frame and supports.

D. Section 06 1000 - Rough Carpentry: Rough wood framing and blocking for door opening.

E. Section 07 9200 - Joint Sealers: Perimeter sealant and backup materials.

F. Section 08 7100 - Door Hardware: Cylinder locks.

G. Section 09 9100 - Paints and Coatings: Field painting.

H. Division 26 - 28 - Electrical: Raceway and Boxes: Empty conduit from control station to door operator.

1.03 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.

B. Wiring Connections: Requirements for electrical characteristics.
   1. 208 V, 3 Phase. See Electrical drawings.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.06 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

B. Preparation instructions and recommendations.

C. Storage and handling requirements and recommendations.

D. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

E. Operation and Maintenance Data.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum FIVE (5) years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum FIVE (5) years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.09 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Overhead Door Corporation; 521 Series Glazed Aluminum Sectional Doors, www.overheaddoor.com.

B. Other Acceptable Manufavturers:
   1. Wayne-Dalton Corporation: www.waynedalton.com.
   2. Cornell Iron Works, Inc.: www.cornelliron.com.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

A. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.

B. Panel Thickness: 1-3/4 inches (44 mm).

C. Center Stile Width: 2-11/16 inches (68 mm)

D. End Stile Width: 3-5/16 inches (84 mm)

E. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).

F. Top Rail Width:
   1. 3-3/4 inches (95 mm).

G. Bottom Rail Width:
   1. 4-1/2 inches (114 mm).

H. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.

I. Springs:
   1. 100,000 cycles.

J. Glazing:
   1. 1/4 inch (6 mm) Tempered glass, at interior locations only.
   2. 1/2 inch (12.5 mm) Tempered Insulating glass, at all exterior locations.

2.03 FINISH AND COLOR:

A. Anodized Finish: Clear anodized.

B. Windload Design: Provide to meet the Design/Performance requirements specified.

C. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

D. Lock: Interior galvanized single unit.

E. Weatherstripping:

1. Flexible bulb-type strip at bottom section.
2. Flexible Jamb seals.
3. Flexible Header seal.

F. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.

G. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.

H. Entrapment Protection: Required for momentary contact, includes radio control operation.
1. Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
2. Electric sensing edge monitored to meet UL 325/2010.
3. Photoelectric sensors monitored to meet UL 325/2010.

I. Operator Controls:
1. Push-button operated control stations with open, close, and stop buttons.
2. Surface mounting.
3. Interior location.

EXECUTION

3.01 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 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.

3.03 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer’s printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.05 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Interior storefront.

C. Infill panels of metal and glass.

D. Aluminum doors and frames.

E. Weatherstripping.

F. Perimeter sealant.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

B. Section 01 4100 - Quality Requirements: General requirements for mock-ups.

C. Section 05 1200 - Structural Steel Framing: Steel attachment members.

D. Section 05 5000 - Metal Fabrications: Steel attachment devices.

E. Section 07 4213.02 - Metal Composite Material (MCM) Wall Panels.

F. Section 07 8400 - Firestopping: Firestop at system junction with structure.

G. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

H. Section 08 4413 - Glazed Aluminum Curtain Walls.

I. Section 08 5113 - Aluminum Windows: Fixed aluminum windows.

J. Section 08 5653 - Wind and Impact Security Windows.

K. Section 08 7100 - Door Hardware: All door hardware, except weatherstripping.

L. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2024.

C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

D. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum; 2020, with Errata (2022).

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

G. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

H. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2026.

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

H. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

J. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).

K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

L. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015 (Reapproved 2023).

M. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

F. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

G. Submit all storefront materials and accessory products to glazing manufacturer to verify materials compatibility with glazing.

H. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least FIVE (5) years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least FIVE (5) years of documented experience.

1.07 MOCK-UP

A. Integrate materials of this Section into the Exterior Assembly Mock-up per the drawing requirements, including Aluminum-Framed Storefront and associated accessories.

B. Locate where directed.

C. Mock-up may not remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Warranty shall include language relating to watertightness and air tightness.

E. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

F. Glazing Warranty: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

2.02 MANUFACTURERS

A. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Exterior Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Product: YES 45 TU - "Center Set Thermally Broken Commercial Storefront System."

2. Include structural reinforcing in mullions as required.
3. Include solid back frame closure at end of storefront runs, sides and top of storefront.
4. Glazing Rabbet: For 1 inch insulating glazing for exterior applications.
5. Glazing Position
   a. Exterior Application: Centered (front to back).
6. Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
7. Provide miscellaneous framing as indicated on drawings.
8. Water Leakage Test Pressure Differential: 12 lbf/sq ft per ASTM E331 and AAMA 501.
9. Air Infiltration Test Pressure Differential: 6.24 psf per ASTM E 283.
10. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
11. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
12. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
13. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
14. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
15. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Aluminum Framed Interior Storefront System (where noted): Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Product: YES 45 FI - "Center Set, Flush Glazed Storefront System."
   2. Include structural reinforcing in mullions as required.
   3. Include solid back frame closure at end of storefront runs, sides and top of storefront.
   4. Glazing Rabbet: For 1 inch insulated glass and 1/4 inch monolithic glazing as follows:
      a. Typical Interior/ Interior Storefront: 1/4" monolithic glazing.
   5. Glazing Position
      a. Interior Application: Center-set.
   6. Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   7. Provide miscellaneous framing as indicated on drawings.
   8. Water Leakage Test Pressure Differential: 12 lbf/sq ft per ASTM E331 and AAMA 501.
   9. Air Infiltration Test Pressure Differential: 6.24 psf per ASTM E 283.
   10. Finish: Class I natural anodized.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
      c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   11. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   12. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.

13. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
14. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
15. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.04 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Flush.
   3. Cross-Section: 2 x 4 1/2 inch nominal dimension for interior applications, unless noted otherwise.

B. Swing Doors: Glazed aluminum.
   1. Thickness: 1-3/4 inches.
   2. Top Rail: 7 inches wide, nominal.
   3. Middle Rail: 8 inches wide, nominal.
   4. Vertical Stiles: 7 inches wide, minimum.
   5. Bottom Rail: 10 inches wide, minimum.
   6. Glazing:
      a. Exterior Doors: Double glazed.
      b. Interior Doors: Single glazed.
   7. Finish: Same as storefront.

C. Provide filler panel to close back of frame.

D. Sub-Sill: At all sill locations (whether or not indicated on the Drawings) provide matching extruded aluminum sub-sill with end dams.

2.05 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   1. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E 283.

D. Water Leakage: None, when measured in accordance with ASTM E 331 at specified pressure differential.

E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

2.06 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209/B209M.

C. Fasteners: Stainless steel.

D. Perimeter Sealant: Type as specified in Section 07 9200 - Joint Sealers.

E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

F. Glazing Accessories: As specified in Section 08 8000 - Glazing.

2.07 FINISHES

2.08 HARDWARE

A. For each door, include weatherstripping.

B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

2.09 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

E. Arrange fasteners and attachments to conceal from view.

F. Reinforce components internally for door hardwareand door operators.

G. Increase gauge or reinforce framing members as required for imposed loads and span conditions.

H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

I. Fit and seal primary frame joints prior to installing filler panel.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions, and with AAMA - Metal Curtain Wall, Window, Storefront and Entrance - Guide Specifications Manual.

B. All flashing and trim that storefront is sealed directly to must be installed prior to field measurements being taken. Coordinate the sequence of the work with the metal panel installer.

C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

D. Provide alignment attachments and shims to permanently fasten system to building structure.

E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

F. Provide thermal isolation where components penetrate or disrupt building insulation.

G. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

H. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

I. Coordinate attachment and seal of perimeter air and vapor barrier materials.

J. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

K. Install glass and infill panels in accordance with Section 08 8000 - Glazing, using glazing method required to achieve performance criteria.

L. Install perimeter sealant in accordance with Section 07 9200 - Joint Sealers.

M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 08 8000
GLAZING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 08 1416 - Flush Wood Doors: Glazed doors. Glazing furnished by door manufacturer.

C. Section 08 4126 - All-Glass Entrances and Storefronts: Glazing furnished as part of entrance assembly.

D. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.

E. Section 08 4413 - Glazed Aluminum Curtain Walls: Glazing furnished by curtain wall manufacturer.

F. Section 08 8300 - Mirrors.

G. Section 10 2800 - Toilet, Bath, and Laundry Accessories: Framed Mirrors.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1036 - Standard Specification for Flat Glass; 2021.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

H. ASTM C1376 - Standard Specification for Pyrolitic and Vacuum Deposition Coatings on Flat Glass.

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

K. GANA (GM) - GANA Glazing Manual; 2022.

L. GANA (SM) - GANA Sealant Manual; 2008.

M. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Provide compatibility testing of IGU edge seal with glazing compounds and setting blocks, and submit results of testing.

E. Product Data on Decorative Privacy Glazing Film for specified product.

F. Samples:
   1. Submit two samples 12x12 inch in size of glass units, showing coloration and design, for selection purposes.

G. Shop Drawing showing plan & elevation of doors to receive film with installation orientation and dimensions.

H. Manufacturer's operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods for Decorative Privacy Glazing Film.

I. Certificates: Certify that products meet or exceed specified requirements.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

B. Labeling: Furnish each pane of fire resistance-rated glazing and each pane of safety glazing with a permanent identification which meets the requirements of the latest approved edition of the International Building Code.

C. Glazing Standards: Comply with recommendations of Glass Association of North America (GANA) "Glazing Manual" and "Sealant Manual", and SIGMA TM-3000, "Vertical Glazing Guidelines", except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this secton or other referenced standards.

D. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

E. Fire Resistance Rated Glass: Provide glass products that meet CPSC 16 CFR 1201, Category II requirements for fire-rated glass and are labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

F. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate certification label of the inspecting and testing organization indicated below.
   1. Insulating Glass Certification Council (IGCC).
      a. ASTM E 2190.

G. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 MOCK-UP

A. Include Glazing in Mock-Up as described in Section 01 4000 - Quality Requirements.

1.08 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Replacements Under Warranties: Provide same warranty as original glass and glazing, beginning from date of replacement completion for glass units replaced under Warranty provisions.

PART 2 - PRODUCTS

2.01 INSULATING GLASS UNITS

A. Type IG-1 - Sealed Insulating Glass Units: Vision glazing, low-E.
   1. Application: All exterior glazing unless otherwise indicated.
   2. Basis of Design: Sunguard SNE 50/25 by Guardian.
   3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint: As selected.
      b. Coating: Low-E (solar control type), on #2 surface.
   4. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
   5. Edge Spacer: See "Sealed Insulating Glass Units" Article below.
   6. Edge Spacer Color: See "Sealed Insulating Glass Units" Article below.
   7. Total Thickness: 1 inch.
   8. Total Visible Light Transmittance: 34 percent, nominal.
   9. Total Solar Heat Gain Coefficient: 21 percent, nominal.
   10. Light to Solar Gain ratio (LSG): 1.62.
   11. Glazing Method: Gasket glazing.

B. Type IG-2 - Sealed Insulating Glass Units: Safety glazing:
   1. Applications: Provide this type of glazing in the following locations:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on the drawings.
   2. Type: Same as other vision glazing except use fully tempered float glass for both outboard and inboard lites.
   3. Edge Spacer: See "Sealed Insulating Glass Units" Article below.
   4. Edge Spacer Color: See "Sealed Insulating Glass Units" Article below.

C. Type IG-3 - Sealed Insulating Glass Units: Spandrel glazing.
   1. Application: Exterior glazing where indicated.
   2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint and coating, same as other sealed insulated glass units.
   3. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
      a. Tint: Clear.
      b. Opacifier: Ceramic frit, on #4 surface.
      c. Opacifier Color: As selected by Architect.
   4. Total Thickness: 1 inch.

5. Glazing Method: Gasket glazing.

D. Type S-1 - Single Vision Glazing:
1. Application: All interior glazing unless otherwise indicated.
2. Type: Annealed float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch.
5. Glazing Method: Gasket glazing.

E. Type S-2 - Fire-Protection-Rated Glazing:
1. IBC Fire Protection Rating: D-H-T-90 or W-90, minimum.
2. Safety Certification: 16 CFR 1201 Category II.
3. Application: Provide this type of glazing in the following locations:
a. Glazed lites in fire doors.
b. Fire windows.
c. Sidelights, borrow lites, and other glazed openings in partitions indicated as having an hourly fire rating.
d. Other locations indicated on the drawings.
4. Fire Rating: As indicated on the drawings.
5. Type: Glass-ceramic safety glazing.
6. Thickness: 1/4 inch.
7. Glazing Method: As required for fire rating.

F. Type S-3 - Single Safety Glazing: Non-fire-rated.
1. Application: Provide this type of glazing in the following locations:
a. Glazed lites in doors, except double glazed lites in doors, and fire doors.
b. Glazed sidelights to doors, except in double glazed sidelites, fire-rated walls and partitions.
c. Other locations required by applicable federal, state, and local codes and regulations.
d. Other locations indicated on the drawings.
2. Type: Fully tempered float glass as specified.
3. Tint: Clear.
4. Thickness: 1/4 inch.
5. Glazing Method: Gasket glazing.

2.02 EXTERIOR GLAZING ASSEMBLIES

A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7.
1. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
3. Glass thicknesses listed are minimum.

2.03 GLASS MATERIALS

A. Float Glass Manufacturers:
1. AGC Glass Company North America, Inc: www.us.agc.com.
2. Guardian Industries Corp: www.sunguardglass.com.
3. Pilkington North America Inc: www.pilkington.com/na.
4. PPG Industries, Inc; [Basis of Design]: www.ppgideascapes.com.
5. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Float Glass: Provide float glass based glazing unless noted otherwise.
1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).

2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
3. Thicknesses: As indicated; for exterior glazing comply with specified requirements indicated for wind load design regardless of specified thickness.

C. Fire-Protection-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
1. IBC Fire Protection Rating: As indicated on drawings.
2. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.
3. Labeling: Provide permanent label on each piece giving the IBC rating and other information required by the applicable code.

D. Fire-Protection-Rated Glazing:
1. IBC Fire Protection Rating: D-H-T-90 or W-90, minimum.

E. High Impact-Resistant Tempered Safety Glazing: Complying with 16 CFR 1201 test requirements for Category II.

F. Glass-Ceramic Safety Glazing: UL- or WH-listed as fire-protection-rated glazing and complying with 16 CFR 1201 test requirements for Category II without the use of a surface-applied film.

G. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.

H. Mirror Glass : ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality Q1 (mirror select); silvering, protective coating and physical characteristics complying with ASTM C1503; 6 mm minimum thick.
1. Sizes noted on Drawings.

2.04 SEALED INSULATING GLASS UNITS

A. Manufacturers:
1. Any of the manufacturers specified for float glass.
2. Any fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
3. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Sealed Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Edge Spacers: Aluminum, bent or soldered corners.
3. Edge Spacer Color: As selected by Architect.
4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
5. Purge interpane space with dry argon air.

2.05 GLAZING COMPOUNDS

A. Manufacturers:
1. Bostik Inc: www.bostik-us.com.
2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
3. Pecora Corporation: www.pecora.com.
4. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
5. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.

C. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

D. Acrylic Sealant: Single component, solvent curing, non-bleeding; ASTM C920, Type S, Grade NS, Class 12-1/2, Uses M and A; with cured Shore A hardness range of 15 to 25; color as selected.

E. Polysulfide Sealant: Two component; chemical curing, non-sagging type; ASTM C920, Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

F. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.

G. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.06 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color as selected.

E. Glazing Clips: Manufacturer's standard type.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.04 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.05 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

F. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.

G. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

H. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

F. Knife trim protruding tape.

3.07 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

3.08 INSTALLATION - INTERIOR WET METHOD (COMPOUND AND COMPOUND)

A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inch centers, kept 1/4 inch below sight line.

B. Locate and secure glazing pane using glazers' clips.

C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.09 INSTALLATION - MIRRORS

A. Install mirrors in accordance with GANA recommendations.

B. Install mirrors in correctly sized openings, using setting blocks (neoprene 80 to 90 Shore A durometer hardness), spacer shims, stainless steel clips, and adhesive compatible with mirror coating and wall substrate.

C. Set mirrors plumb and level, free of optical distortion.

D. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

3.10 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.11 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.12 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 08 9100
LOUVERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 07 6200 - Sheet Metal Flashing and Trim.

C. Section .

D. Division 23 - Mechanical Sections.

1.03 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

C. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.

D. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2021, with Editorial Revision (2022).

E. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

F. FEMA P-361 - Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms; 2024.

G. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters; 2020.

H. ASTM D822 - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

I. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

J. ASTM D2244 - Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.

K. FEMA 361 - Design and Construction Guidance for Community Safe Rooms.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.

D. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.

E. Test Reports: Independent agency reports showing compliance with specified performance criteria.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer warranty against distortion, metal degradation, and failure of connections.

C. Finish: Provide twenty year warranty against degradation of exterior finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Louvers:
   1. Airolite Company, LLC : www.airolite.com.
   2. Construction Specialties, Inc: www.c-sgroup.com.
   3. Greenheck: www.greenheck.com
   4. Nystrom: www.nystrom.com.
   5. Ruskin Company: BASIS OF DESIGN www.ruskin.com.

2.02 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
   1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
   2. High-Velocity Wind Load Resistance: Design to comply with applicable requirements of ICC 500 and FEMA P-361, including resistance to horizontal debris impact.
   3. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
   4. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
   5. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

B. Stationary Louvers : Horizontal blade, extruded aluminum construction, with concealed intermediate mullions. Storm resistant.
   1. Manufacturers:
   2. Free Area: 57 percent, minimum.
   3. Blades: Drainable.
   4. Frame: 6 inches deep nominal, channel profile; corner joints mitered and, with continuous recessed caulking channel each side, and extended subsill.
   5. Aluminum Thickness: Frame 12 gauge, 0.0808 inch minimum; blades 12 gauge, 0.0808 inch minimum.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M) .

B. Bird Screen: Interwoven wire mesh of steel, 0.063 inch diameter wire, 1/2 inch open weave, diagonal design.

C. Insect Screen: 18 x 16 size aluminum mesh.

D. Primer: Zinc chromate, alkyd type.

2.04 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

2.05 ACCESSORIES

A. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

B. Fasteners and Anchors: Stainless steel.

C. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver frames in openings with concealed fasteners.

E. Install perimeter sealant and backing rod in accordance with .

F. Coordinate with installation of mechanical ductwork.

3.03 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

END OF SECTION

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SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Fire rated area separation walls.

D. Fiber reinforced backing board.

E. Gypsum wallboard.

F. Moisture-Resistant board.

G. Glass mat faced gypsum board sheathing.

H. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

B. Section 05 4000 - Cold-Formed Metal Framing: Structural steel stud framing.

C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

D. Section 07 2100 - Thermal Insulation: Acoustic insulation.

E. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.

F. Section 07 9200 - Joint Sealers: Acoustic sealant.

1.03 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2012.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2025.

E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2024.

G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2025.

I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

K. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

L. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

M. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2024.

N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

P. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

Q. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2026.

R. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; 2021a.

S. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

T. GA-238 - Guidelines for the Preventions of Mold Growth on Gypsum Wallboard; 2003.

U. GA-253 - Recommended Specifications for the Application of Gypsum Sheathing; Gypsum Association; 1999.

V. GA-600 - Fire Resistance and Sound Control Design Manual; 2021.

W. GA-801 - Handling and Storage of Gypsum Panel Products: A Guide For Distributors, Retailers, and Contractors; 2007.

X. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Y. ISO 16000-23 - Indoor Air – Part 23: Performance Test for Evaluating the Reduction of Formaldehyde and Other Carbonyl Compounds Concentrations by Sorptive Building Materials; 2018.

Z. UL (FRD) - Fire Resistance Directory; Current Edition.

AA. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.

D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
   1. Maintain one copy of standards at project site.
   2. Where indicated, provide materials and construction which are identical with those of assemblies whose fire resistance rating has been determined per ASTM E 119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 3 years of experience.

C. Single Source Responsibility: Comply with one of the following:
   1. Obtain all steel framing and all metal trim from a single manufacturer.
   2. Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.
   3. Provide a confirmation letter from both the gypsum board manufacturer and the joint compound manufacturer that their products are compatible and warrantable if used together.

D. Pre-Construction Conference: Prior to beginning work associated with roof system, the Contractor and appropriate subcontractors shall meet to discuss coordination of the work of the trades associated with the installation of the roof system, suspended acoustical and gypsum board ceiling, suspended mechanical ductwork, suspended light fixtures, etc. This work shall be planned and coordinated to provide hanger attachments needed by the various trades in a manner that will minimize conflict with installation of the roof system.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable Code for fire rated assemblies as indicated on drawings.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside, under cover, and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

C. When materials are moved into the building, distribute pallets and loads evenly around work areas so as to avoid overloading structure, causing damage to any materials, interfering with work of other trades, etc.

D. Handle gypsum boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads, trim, etc.

PART 2 - PRODUCTS

2.01 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Aegis Metal Framing, LLC.
   2. ClarkDietrich Building Systems: www.clarkdietrich.com.
   3. Marino/WARE Industries, Corp.: www.marinoware.com.
   4. MBA Metal Framing: www.mbastuds.com.
   5. SEMCO, Southeastern Metals, Div of Gibraltar Industries.
   6. Steel-Con; Div. of Steel Construction Systems.
   7. Telling Industries, LLC.
   8. Substitutions: See Section 01 6000 - Product Requirements.

B. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf. Install with flange edges bent back 90 deg. and doubled over to form 3/16-inch minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and minimum depth as follows:
   1. Metal studs at interior partitions shall have web depth of 3-5/8-inches or 6-inches at locations indicated on the drawings, and a minimum base metal thickness of 0.0296-inches, spaced at 16-inches o.c., unless indicated otherwise below or otherwise shown on

drawings or required by project conditions. EQ studs allowed for spans up to 16'-0" vertically when 3rd party test data (e.g. ICC-ES report) is provided.

2. Jamb studs shall be no less than 20 gauge.
   a. Studs shall be joined together at 4'-0" intervals.
3. Use double studs or 6-inch studs, as indicated or as otherwise required, for chase walls, piping, conduits, or etc.
4. Special stud tracks for curved walls shall be equivalent to "Flex-C Trac" galvanized flexible segmented track with slidable side straps, as manufactured by Flex-Ability Concepts, Inc.; Oklahoma City, OK.
5. Runners: U shaped, sized to match studs.
6. Ceiling Channels: C-shaped.
7. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
8. Resilient Furring Channels: 1/2 inch depth, 25 gauge minimum, for attachment to substrate through one leg only.

C. Exterior Non-Loadbearing Studs and Furring for Application of Gypsum Board: As specified in Section 05 4000 - Cold Formed Metal Framing.

D. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 4000 - Cold Formed Metal Framing.
   1. Studs: "C" shaped with knurled or emobossed faces.
   2. Any interior load-bearing studs shall be at least 6-inches depth x 18 gauge, or 8-inches x 18 gauge, unless otherwise indicated on Drawings - galvanized C-studs spaced at 16-inches o.c.

E. Steel Framing Components for Suspended and Furred Ceilings:
   1. General: Provide components which comply with ASTM C 754 for materials and sizes, unless otherwise indicated.
   2. Wires for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
   3. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
   4. Steel Studs for Furring Channels: ASTM C 645, with flange edges bent back 90 deg. and doubled over to form 3/16-inch minimum lip (return), minimum thickness of base (uncoated) metal and minimum depth as follows:
      a. Thickness: 20 gauge, unless otherwise indicated.
      b. Depth: As indicated.
      c. Spacing: As indicated in referenced standard and on drawings, but no less than at all edges and 24-inches o.c.
   5. Steel Rigid Furring Channels: ASTM C645, hat-shaped, depth of 7/8-inch, and minimum thickness of base (uncoated) metal as follows:
      a. Thickness: 20 gauge at interior and 18 gauge at exterior, unless otherwise indicated.
      b. Spacing: As indicated in referenced standard and on drawings, but not less than at all edges and 16-inches o.c.
         1) At ceilings and soffits indicated to receive more than a single layer of gypsum board, spacing shall be not less than at all edges and 16-inches o.c.
   6. Grid Suspension System: ASTM C 645, manufacturer's standard grid suspension system composed of main beams and cross furring members which interlock to form a modular supporting network.
      a. Locations for Use: Provide grid type suspension systems for sloped and horizontal ceiling applications of interior gypsum board products which are not attached directly to primary framing system; Minimum 4-feet x 4-feet grid and cross tees at 2-feet o.c., with minimum installation requirements as required by manufacturer's current written instructions, referenced standards, and as indicated in this Section and Section 09 5100 - "Suspended Acoustical Ceilings". Provide and comply with

manufacturer's published requirements for accessories, trim and hanger wire, and as otherwise required to provide flat ceilings without deflection or sag.

b. Product/Manufacturer: Provide suspended modular grid furring system equivalent to standard drywall suspension system for flat ceilings, with 1-1/2-inch grid faces, and as follows:
   1) Equivalent to "Drywall Suspension System", as manufactured by USG Interiors, or one of the other above named manufacturers.

F. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

G. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and screwed to secondary deflection channel set inside but unattached to top track.
   1. Bottom Track: Unless otherwise indicated or required by project conditions, fire-ratings, etc., provide manufacturer's standard Deep Leg Tracks, unpunched unless otherwise indicated, of size, shape and gauge indicated, with 1-5/16-inch flange.
   2. Deflection Track: Typical at stud walls up to slab or similar fixed structure at top of walls: Provide for no less than 1" of vertical movement, equivalent to one of the following:
      a. Deep Leg Track System
      b. Track-Over-Track System
      c. Slotted Track System
   3. Special stud tracks for all curved walls shall be equivalent to "Flex-C Trac" galvanized flexible segmented track with slidable side straps, as manufactured by Flex-Ability Concepts, Inc.; Oklahoma City, OK.
   4. Special stud tracks for all arched walls shall be equivalent to "Flex-C Arch" galvanized flexible segmented track with slidable straps, as manufactured by Flex-Ability Concepts, Inc.; Oklahoma City, OK.
   5. Provide deflection track at exterior wall and floor-to-floor walls - typical.

H. Continuous Horizontal Bridging/ Bracing:
   1. 1-1/2-inch cold-rolled channels (galvanized); 0.0538-inch minimum bare metal G60.
   2. Spacing: 4'-0" or 4'-6" o.c. vertically, through pre-punched slots in studs.
   3. Splice Plates: 16 gauge at all splices.
   4. Anchors (bridging channels to studs): 1-1/2-inches x 2-inches x 16 gauge clip angle, 1/4-inch less than stud width, secured with four (4) 5/8-inch S-14 screws. (Anchors required at ends of runs, where snap-in fit to stud slots is not snug or allows stud to move/slide on channels, and at studs on each side of splices in bridging channels).

I. Strap Bracing/Blocking: 16 gauge steel flat strapping/blocking, minimum 6" width. Provide with manufacturer's recommended attachment.

2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. Temple-Inland.
   2. CertainTeed Corporation: www.certainteed.com/#sle.
   3. Georgia-Pacific Corp.
   4. Gold Bond Building Products Div., National Gypsum Company.
   5. Lafarge Gypsum.
   6. United States Gypsum Company.
   7. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced as defined in ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut, and as follows:
   1. Application: Use for vertical surfaces and horizontal surfaces, unless otherwise indicated.

2. DO NOT PROCEED WITH INSTALLATION OF STANDARD DRYWALL UNTIL THE BUILDING IS DRIED-IN AND FULLY CONDITIONED.
3. Fire Resistant Type: Type X board (UL or WH listed) at all locations, unless other type is required by indicated tested assembly.
4. Thickness (unless indicated otherwise):
   a. Vertical Surfaces: 5/8 inch.
   b. Ceilings: 1/2 inch.
5. Edges: Tapered.

C. Backing Board For Tile:
1. Fiber-Reinforced Gypsum Panels: As defined in ASTM C1278, mold-resistant, and with water-resistant core. No paper face.
2. Thickness: 5/8 inch.
3. Product:
   a. Georgia Pacific "DensShield Tile Backer".
   b. USG Fiberock brand "Aqua-Tough" Tile backerboard.
   c. Substitutions: See Section 01 6000 - Product Requirements.
4. Application: Wall surfaces behind tile.

2.03 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 0200 - Joint Sealers.

B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.

C. Extruded Moldings and Reveal Moldings: Provide manufacturer's standard alloy 6063-T5 extruded units with 70% resin 2-coat "Kynar 500" baked enamel finish, and as follows:
1. Design: Provide shapes and configurations as indicated on the Drawings.
   a. Form reveal moldings to cover at least two sides and rear of reveal.
   b. At drywall (or plaster) edge, provide continuous expanded metal edge, designed for mudding-in.
   c. At ceiling grid edge, provide continuous edge designed for compatibility with lay-in ceiling grid.
   d. Wall to gypsum ceiling reveal: provide continuous reveal molding equal to Fry Reglet "Z" reveal: with 1/2" wide reveal. Paint to match ceiling.
2. Color: To match ceiling grid in same room where occurs, unless indicated otherwise, and color as selected by Architect at any exterior locations.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners of glass-mat faced boards, and where recommended by manufacturer. Joint material shall be compatible with and approved by air barrier manufacturer, where applicable.
2. Tape: 2 inch wide, creased paper tape for joints and corners of paper faced boards, and where recommended by manufacturer.
3. Ready-mixed vinyl-based joint compound.
4. Chemical hardening type compound.

E. Level 5 Surface System Options:
1. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

2. Factory-Applied Skim-Coated Drywall with matching Joint Compound: Rapid Deco Level 5 System by Lafarge.

F. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated or other corrosion resistant material exceeding 800 hour ASTM B117 testing, for exterior locations.

G. Fasteners: Provide fasteners of type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum drywall manufacturers for applications indicated.

H. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.
   1. Environmental Requirements, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840, with gypsum board manufacturer's recommendations, and with adhesive manufacturer's recommendations, for before, during, and after installation.
   2. Minimum Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40º.
   3. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

3.02 SEQUENCING AND SCHEDULING

A. Sequence installation of gypsum board and sheathing with installation of exterior cladding and roofing to comply with requirements indicated below:
   1. Do not leave gypsum sheathing board exposed to weather after its application for more than one month or, if protected as indicated below, for more than 6 months, unless otherwise warranted by manufacturer:
      a. Cover exterior surface of sheathing with a temporary air infiltration barrier equivalent to 6-mil polyethylene film. Apply covering immediately after sheathing is installed.
      b. Remove covering just prior to installation of asphalt felt, face brick, and similarly applied exterior materials.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members or as indicated.

C. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center minimum.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.
   3. Suspend ceiling hangers from building structural members and as follows:
      a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
      b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard

suspension system members, install supplemental suspension members and hangers in form of trapeze or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

c. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
d. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
e. Secure hangers to structural support by connecting directly to structure where possible; otherwise, connect to anchorage devices or fasteners as indicated or required.
f. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
g. Do not attach hangers to steel deck tabs.
h. Do not attach hangers to steel roof deck. Attach hangers to structural members.
i. Do not connect or suspend steel framing from ducts, pipes or conduit.
j. Keep hangers and braces 2-inches clear of ducts, pipes and conduits.
k. Sway-brace suspended steel framing with hangers used for support.
l. Install suspended steel framing components in sizes and at spacing indicated but not less than that required by referenced steel framing installation standard
    1) Wire Hangers: 12 gauge, 4-feet on center. Install supplementary hangers as necessary at ceiling fixtures to provide a hanger at each corner of each fixture, diffuser, grille, and other ceiling-mounted equipment. /// FR JM RFI UNA/////////
m. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross furring members to each other and butt-cut to fit into wall track.

4. Install bracing as required at exterior locations to resist wind uplift.

D. Studs: Space studs at 16 inches on center.
1. Extend partition framing to structure in all locations unless otherwise indicated.
2. Installation Tolerances: Install each steel framing and furring member so that fastening surface does not vary more than 1/8-inch from plane of faces of adjacent framing.
3. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
4. Extend non-bearing wall partition framing to 6 inches above adjacent ceiling heights, except where partitions are indicated to terminate at suspended ceilings.
    a. Provide studs up to tie to structure at 4'-0" o.c. minimum, from partitions terminating below ceilings
5. Install steel studs and furring in sizes and at spacings, indicated but not less than that required by referenced steel framing installation standard.
6. Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flange.
7. Install horizontal steel bridging/bracing in all walls, and the additional strap bracing at curved walls as steel framing progresses. Install in compliance with stud manufacturer's recommendations, at spacing indicated
    a. Galvanized steel strap bracing shall be provided continuous at top and bottom runner tracks and at bridging locations at all curved stud walls.

8. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on Drawings:
   a. Where edges of suspended ceilings abut building structure horizontally at ceiling perimeters or penetration of structural elements.
   b. Where partition and wall framing abuts overhead structure:
      1) Unless framing is specifically indicated to terminate below ceilings, all framing and gypsum board shall extend up to bottom of structure above.
9. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
10. Install runners (tracks) at floors, ceilings and structural walls and columns, where gypsum drywall stud system abuts other construction.

E. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
   1. Frame door openings to comply with details indicated, with GA-219 and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Extend vertical jamb studs (double studs-typical) through suspended ceilings and attach to underside of floor or roof structure above, unless otherwise indicated.
   2. Frame openings other than door openings to comply with details indicated, or if none indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.
   3. Spot grout hollow metal door frames for solid core wood doors, hollow metal doors and doors over 32-inches wide. Apply spot grout at each jamb anchor clip just before inserting board into frame.

F. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Horizontal.
   2. Spacing: At 16 inches on center minimum.

G. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated and to GA-600 requirements.

H. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, wood frame openings, toilet accessories, hardware, and heavy trim, shelving, furnishings and equipment services. Attach metal blocking to studs using manufacturer's recommended method. Bolt or screw steel channels to studs. Utilize 16 gauge flat strapping/blocking minimum 6" width. For all other trades, comply with Section 06 1000 for wood blocking.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

B. Control Joints: Place control joints consistent with lines of building spaces, as indicated on drawings or as follows:
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. At exterior soffits, not more than 30 feet apart in both directions.
   3. Install control joints at spacings and locations required by referenced gypsum board application and finish standard, and approved by the Architect for visual effect.

C. Corner Beads: Install at external corners, using longest practical lengths.

D. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

A. General: Apply treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.

B. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
   1. Joint tape and joint compound shall be compatible with waterproofing subsequently applied.

C. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

D. Fiber Reinforced Gypsum and Cement Board: Use alkali-resistant glass fiber tape, recommended by manufacturer, embedded in latex-fortified mortar or latex-based Type 1 mastic over the joint. Use same material as specified for tile setting.

E. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
   5. Level 0: Temporary partitions.

F. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
   3. Taping, filling, and sanding are not required at base layer of double-layer applications.

G. Prefill open joints and rounded or beveled edges, if any, using setting-type joint compound.

H. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.

I. Finish interior gypsum wallboard by applying the following joint compounds in 3 coats (not including prefill of openings in base), and sand between coats and after last coat:
   1. Embedding and First Coat: Ready-mix drying-type all-purpose or taping compound.
   2. Fill (Second) Coat: Ready-mix drying-type all-purpose or topping compound.
   3. Finish (Third) Coat: Ready-mix drying-type all-purpose or topping compound.

J. Partial Finishing: Omit third coat and sanding on concealed drywall construction which is indicated for drywall finishing, except where finishing is required to achieve fire-resistance rating, sound rating or to act as air or smoke barrier

K. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
   1. Option: Rapid Deco Level 5 System by Lafarge North America.

3.06 CLEANING AND PROTECTION OF WORK

A. Promptly remove any joint compound and adhesives and similar residue from adjacent surfaces, as it may occur.

B. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall construction remain without damage or deterioration at time of Substantial Completion.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

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SECTION 09 3000
TILING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Ceramic trim.

D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 07 9005 - Joint Sealers.

C. Section 09 2116 - Gypsum Board Assemblies: Description and installation of tile backer board.

1.03 REFERENCE STANDARDS

1. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.
2. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.
3. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

B. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2024.

C. ANSI A108/A118/A136.1 - Specifications for the Installation of Ceramic Tile; 2020.
1. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.

D. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

E. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

F. TCNA (HB-GP) - Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation; 2025-2026.

G. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2025.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting minimum of two weeks before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives. Include test results where indicated.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on one plywood panel, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

E. Samples: Submit two each 3 by 3 inch tile samples for color and product verification.

F. Certificate: Certify products of this section meet or exceed specified requirements.

G. Installer's qualification statement.
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation; www.tile-assn.com/#sle

H. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Tile: 2 percent of each size, color, and surface finish combinationbut not less than 10 square feet of each type.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 MOCK-UPS

A. Include Tiling in Mock-Up as described in Section 01 4000 - Quality Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - CONSTRUCTION WASTE MANAGEMENT and DISPOSAL for packaging waste requirements.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Tile:
   1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 TILE

A. Glazed Wall Tile, Type __: ANSI A137.1 standard grade.
   1. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
   2. Color: As indicated on drawings.

B. Porcelain Tile, Type _____: ANSI A137.1 standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Color: As indicated on drawings.
   3. Trim Units: Matching cove base shapes in sizes coordinated with field tile as noted.

C. Floor Tile Coefficient of Friction:
   1. Minimum Slip Resistance: Dynamic Coefficient of Friction, per ANSI A137.1-2012, shall be 0.42 (per the DCOF AcuTest) for any tile used on walking surface.

2.03 TRIM AND ACCESSORIES

A. Ceramic Accessories:same color and finish as adjacent field tile; same manufacturer as tile.

B. Porcelain/Ceramic Trim: Matching bullnose shapes in sizes coordinated with field tile.
   1. Applications:
      a. Open Edges: Bullnose.
      b. Inside Corners: Jointed.
      c. Floor to Wall Joints: Cove base, unless indicated otherwise.
   2. Manufacturers: Same as for tile.

C. Non-Porcelain/Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Applications:
      a. Open edges of wall and floor tile.
      b. Inside and outside wall corners.
      c. Transition between floor finishes of different heights.
         1) Schluter Reno, or as indicated on drawings.
      d. Thresholds at door openings.
      e. Floor and wall expansion and control joints.
      f. Floor-to-wall joints.
      g. Borders and other trim as indicated on drawings.
   2. Products:
      a. Schluter-Systems: www.schluter.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ADHESIVE/BOND COAT MATERIALS

A. Manufacturers:
   1. Bostik Inc: www.bostik-us.com.
   2. Mapei Corporation: www.mapei.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Adhesive: Latex-Portland Cement Mortar Bond Coat, ANSI A118.4.

2.05 GROUTS

A. Grout: 100% solids epoxy grout as specified in ANSI A118.3 - most current standard.
   1. Colors: To be selected by Architect from manufacturer's full range.
   2. Locations: At all locations, unless noted otherwise.

2.06 SETTING-BED MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.

2.07 ACCESSORY MATERIALS

A. Cleavage Membrane: No. 15 asphalt saturated felt; complies with ANSI 108.02-3.8.

B. Vapor Retarder Membrane at Walls: No. 15 (6.9kg) asphalt saturated felt. Complies with ANSI A108.02-3.8.

C. Waterproofing Membrane: Equivalent to "ECB Anti-Fracture Membrane", as manufactured by NAC Products, Inc.; Cuyahoga Falls, Ohio (Phone: 1-800-633-4622).
   1. Provide complete system, including substrate primer/sealer, 40-mil, two component, self-adhering membrane, and appropriate top-coat primer for the material(s) to be placed over the ECB system.

2. Locations for Use: Below all tile flooring, turned up 1-inch at all edges and concealed by base material, and turned down at least 2-inches into floor drains.
3. Completed membrane system is intended for waterproofing, and to bridge substrate joints within the limitations stated in manufacturer's current written product data.

D. Substitutions: Section 01 6000 - Product Requirements.

E. Reinforcing Mesh: 2 x 2 inch size weave of 16/16 wire size; welded fabric, galvanized.

F. Mesh Tape: 2-inch wide self-adhesive fiberglass mesh tape, complies with ASTM C475.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive tile.

B. Verify wall surfaces are smooth and flat within tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Vacuum clean surfaces and damp clean.

B. Seal substrate surface cracks with filler.

C. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to feather edge.

D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108/A118/A136, manufacturer's instructions, and TCNA (HB) or TCNA (HB-GP) recommendations, as applicable.

B. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

C. Use manufacturer's recommended grout joint width. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

D. Form internal angles square and external angles bullnosed.

E. Install ceramic accessories rigidly in prepared openings.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

L. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCA Handbook Method F131, epoxy bond coat and grout, unless otherwise indicated.
   1. Use waterproofing membrane under all tile.
   2. Where waterproofing membrane is indicated, install as recommended by manufacturer, and in accordance with applicable TCA Handbook Method.

B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.05 INSTALLATION - FLOORS - MORTAR BED METHODS

A. Over exterior concrete substrates, install in accordance with TCA F101, bonded, with grout as indicated in finish schedule on Drawings.

B. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated on drawings.
   1. Where waterproofing, cleavage, or crack isolation membrane is indicated on drawings, with standard grout or no mention of grout type, install in accordance with TCNA (HB) Method F121.
   2. Where epoxy bond coat and grout are indicated on drawings, install in accordance with TCNA (HB) Method F132, bonded.
   3. Where epoxy or furan grout is indicated on drawings, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F114, with cleavage membrane.

C. Cleavage Membrane: Lap edges and ends.

D. Mortar Bed Thickness: 5/8 inch, unless otherwise indicated on drawings.

3.06 INSTALLATION - WALL TILE

A. On exterior walls, install in accordance with TCNA (HB) Method W244E, thin-set over cementitious backer units, with waterproofing membrane.

B. Over interior cementitious backer units on studs, install in accordance with The Tile Council of North America Handbook Method W244C, using waterproof membrane, and epoxy grout.

C. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

D. Over interior concrete and masonry install in accordance with The Tile Council of North America Handbook Method W202 thin-set with epoxy bond coat and grout.

3.07 CLEANING

A. Clean tile and grout surfaces.

3.08 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

3.09 SCHEDULE

A. See Finish Schedule on Drawings.

END OF SECTION

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SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

C. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

D. Perimeter Trim.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 07 2100 - Thermal Insulation: Acoustical insulation.

C. Section 07 9005 - Joint Sealers: Acoustical sealant.

1.03 REFERENCE STANDARDS

A. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low Alloy with Improved Formability.

B. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

C. ASTM A 653 (Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

D. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

E. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

F. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

G. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

H. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

I. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

J. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2022.

K. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.

L. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

M. ASTM C 1264 Classification for Acoustical Ceiling Products.

N. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Samples: Submit two samples 6x6 inch in size illustrating material, edge detail and finish of acoustical units.

E. Samples: Submit two samples each, 8 inches long, of suspension system main runner, cross runner, and perimeter molding.

F. 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.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.
   1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
   2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.
   3. Fire Resistance: As follows tested per ASTM E 119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory.

C. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

E. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.07 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.

1.08 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

B. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and

ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.09 WARRANTY

A. Acoustical Panel: 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. Acoustical Panels: Sagging and warping
   2. Grid System: Rusting and manufacturer's defects

B. Warranty Period:
   1. Acoustical panels: Ten (10) years from date of substantial completion.
   2. Grid: Ten (10) years from date of substantial completion.
   3. 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.
   4. Acoustical panels and grid systems with Humidity/Sag Resistant Treatment supplied by one source manufacturer shall be warranted for 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.

1.10 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 quantity 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.

B. See Section 01 6000 - Product Requirements, for additional provisions.

C. Deliver extra stock to Owner’s representative.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc; [Basis of Design]: www.armstrong.com.
   2. USG Corporation: www.usg.com/ceilings/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Suspension Systems:
   1. Armstrong World Industries, Inc; [Basis of Design]: www.armstrong.com.
   2. USG Corporation: www.usg.com/ceilings/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACOUSTICAL UNITS

A. Acoustical Panels:
   1. As indicated on Ceiling Finish Legend.

2.03 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

B. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
   1. Structural Classification: ASTM C 635 Intermediate Duty
   2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 12 gauge.

E. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Products: See Ceiling Finish Legend

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
   1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
   2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

D. Perimeter Moldings: Same metal and finish as grid.

E. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9005.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

C. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressy permitted by manufacturer's printed recommendations.

3.02 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.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions, with authorities having jurisdiction, and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

K. 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.

L. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions. Comply with ASTM C 636 and with authorities having jurisdiction.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units with pattern parallel to longest room axis, unless indicated otherwise.

D. Fit border trim neatly against abutting surfaces.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

I. Install hold-down clips on panels within 20 ft of an exterior door.

J. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

K. 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.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 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. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with new product to eliminate evidence of damage.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021 (Reapproved 2025).

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Shop Drawings: Indicate seaming plans and floor patterns.

D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

E. Verification Samples: Submit one sample, 9 by 9 inch in size illustrating color and pattern for each resilient flooring product specified, and two 3 by 3 inch samples.

F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: Provide minimum of 5% of each type and color.
   3. Extra Wall Base: Provide minimum of 5% of each type and color.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

C. Pre-Installation Testing: Conduct pre-installation testing as follows: Moisture tests, Bond test, and pH test.

1.07 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
   1. Material should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational, controlled and set at a minimum of 68º F (20º C) for at least 48 hours prior to the installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

D. Protect roll materials from damage by storing on end.

E. Do not double stack pallets.

1.09 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.10 WARRANTY

A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

C. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 RESILIENT TILE FLOORING

A. Luxury Vinyl Tile (LVT):
   1. Minimum Requirements: Comply with ASTM F 1700 Class III, Type B - Embossed Surface.

2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
3. Smoke Developed: 450 or less, when in accordance with ASTM E 662.
4. Static Load Limit: 250 psi, when tested in accordance with ASTM F 970 (modified).
5. Size: See Finish Legend.
6. Wear Layer Thickness: 0.020 inch (nominal) minimum.
7. Total Thickness: See finish legend.
8. Durability: 0.125 inch - Very Good.
9. Maintainability: 0.125 inch - Excellent.
10. Resilience: 0.125 inch - Excellent.
11. Manufacturer/ Style/ Color: See Finish Legend.

2.02 RESILIENT BASE

A. Resilient Base - Type ____: ASTM F1861, Type TS, rubber, vulcanized thermoset; style as scheduled.
   1. Height: See Finish Legend.
   2. Thickness: 0.125 inch.
   3. Finish: As selected by Architect.
   4. Length: Roll.
   5. Manufacturers:
      a. Johnsonite, a Tarkett Company; [Basis of Design]: www.johnsonite.com.
      b. Roppe Corporation: www.roppe.com/#sle.
      c. Substitutions: See Section01 6000-Product Requirements.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: Same material as flooring, except where indicated otherwise.

D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
   1. Test as Follows:
      a. Alkalinity (pH): ASTM F710.
      b. Internal Relative Humidity: ASTM F2170.
      c. Moisture Vapor Emission: ASTM F1869.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710;

obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

F. Confirm tiles are square and true. Cull all non-conforming tiles.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's instructions. See finish plans for pattern and tile layout.

C. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

F. Fit joints tightly. Window panes in tiles are not acceptable.

3.04 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

C. General Requirement: All resilient tile shall be from one manufacturer.

D. Cutting of resilient tile:
   1. Tolerance between cuts is to be 0.002” (2/1000th of an inch).

E. Preparation for shipping of resilient tile:
   1. Tiles shall be packed in an appropriate sized box with padding. No loose tiles on pallets.
   2. Each box shall have labels indicating contents of box.
   3. First box to be opened shall be clearly marked.
   4. Boxes shall be palletized and shrink wrapped.
   5. Installer to be notified in writing of the importance of having a smooth, flat surface.
   6. Shipment shall be insured by shipper.

F. Installation of resilient tile:
   1. Install according to manufacturer’s recommendations.

3.05 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 72 inches between joints.

B. Miter internal and external corners.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and wax resilient flooring in accordance with manufacturer's instructions, and also upon coordination with manufacturer's representative and Architect.

3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

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SECTION 09 8400
SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2023.

D. CAN/ULC-S102.2 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies; 2019 Revised.

1.02 SECTION INCLUDES

A. Acoustic Suspended Ceiling and Wall Panels.

1.03 RELATED SECTIONS

A. Section 09 84 33 - Sound-Absorbing Wall Units

B. Section 09 84 36 - Sound-Absorbing Ceiling Units

C. Section 05 31 00 - Steel Decking: Acoustical steel deck.

D. Section 09 11 10 - Non-Loadbearing Metal Framing: Ceiling suspension systems.

E. Section 09 26 00 - Gypsum Board Assemblies.

F. Section 09 51 10 - Suspended Acoustical Ceilings: Conventional grid-supported acoustic ceilings.

G. Section 09 90 00 - Paints and Coatings

1.04 SUBMITTALS

A. General: Submit manufacturer’s documentation for each type of product under provisions of Section 01 30 30 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, panel layout.

D. Selection Samples: Manufacturer's color charts for applicable material, indicating full range of material, colors, and patterns available.

E. Verification Samples: Fabricated samples of each type of product specified; 6” minimum length and width, showing construction, edge details.

F. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

G. Maintenance Materials: Furnish maintenance information and recommendations for Owners use.

1.05 QUALITY ASSURANCE

A. Source Limitations: All similar products to be obtained from a single manufacturer through one source providing a comprehensive material and installation package.

B. Installer Qualifications: Utilization of an installer with demonstrated experience and quality in projects of similar size and complexity.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation. Ensure all supplied hardware, material, and components are maintained until product is fully installed.

B. Store units flat, in dry, well-ventilated space; do not stand on end.

C. Protect edges from damage.

D. Acclimatize product for minimum 24 hours at temperature and humidity approximately that of occupancy prior to installation.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install materials until spaces are enclosed from the exterior environment, wet work in spaces is complete and dry, and HVAC system is maintaining an ambient temperature at occupancy levels during the remainder of the construction period.

B. Field Measurements: Installer to verify field measurements and dimensions as indicated in Shop Drawings.
   1. Coordinate location of other product and trades with product layout.

C. Ensure that Shop Drawing or Product Order Form signoffs and other required information are supplied in time to prevent interruption of construction process. Ensure that products of this section are supplied to affected trades in time to prevent interruptions.

1.08 WARRANTY

A. Special Warranty: Refer to manufacturer's standard warranty for specific products, terms, and limitations.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturer: Turf Design; Located at 41 Prairie Pkwy, Gilberts, IL 60136; Phone: 844.TURF.OMG (844.887.3664); Email: hello@turf.design; Web: www.turf.design

B. Substitutions: Not permitted.

2.02 SOUND-ABSORBING AND SOUND-DIFFUSING PANELS

A. Basis of Design:
   1. Turf Design; Product: 'Baffle' 'Arbor Baffle' https://turf.design/

B. Material Minimum Performance Attributes:
   1. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   2. UL Tested ASTM E84: Class A
   3. CAN/ULC-S102.2 Compliant
   4. Noise Reduction Coefficient (NRC):
      a. ASTM E795: E400 Mounting - Each unit consisted of four (4) baffles spaced 4.0 inch. on center. Each baffle measured 96.00 inch. long. The specimen consisted of four full units arranged in a continuous array.
         1) Avg. apparent NRC > 0.55 or greater.
         2) Avg. apparent NRC > 0.95 or greater with felt Infill Panel.
   5. VOC: ASTM D5116 compliant

C. Product Attributes:
   1. Panel Size: As indicated by manufacturer and per Architects approval.
   2. Panel Thickness: As indicated by manufacturer and per Architects approval.
   3. Edges: Exposed felt, machined edge.

4. Corners: Square, exposed felt, machined edge.
5. Material: Polyester (PET) felt, 60% pre-consumer recycled.
6. Color: As selected by Architect from manufacturer's full range.
7. Patterns: As selected by Architect from manufacturer's full range.
8. Mounting Method: Direct connection to 15/16” flat Tee Grid installed at 24” on center unless noted otherwise by manufacturer.

2.03 FABRICATION

A. General: CNC fabricate panels to sizes, configurations, and patterns on PET felt assembly (9mm PET felt board with folded edge construction). Integrated support and mounting hardware factory installed.

B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and square-ness from corner to corner.

2.04 ACCESSORIES

A. Ceiling-Suspended Accessories:
   1. Contractor to provide and install supporting components as required for installation. Refer to installation drawings (provided upon production kickoff) for hardware details, locations, and inclusions.
      a. Suspend product at elevations indicated by the Architects drawings.
   2. Contractor to select and provide all anchors to building for mounting based on site requirements, conditions, and as appropriate for application.
   3. Optional factory installed end caps for Arbor baffles. Provided by request only, additional pricing may apply.
   4. Optional felt infill panels for 24”x24” square Tee Grid installation available for additional acoustic performance. Provided by request only, additional pricing may apply.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected. Notify manufacturer immediately of any damage.

3.02 INSTALLATION

A. Install acoustical units in locations indicated, following manufacturer's installation instructions and in accordance with local jurisdiction authorities.

B. Align panels accurately, with edges plumb and top edges level.

C. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
   1. Plumb and level.
   2. Flatness.
   3. Width of joints.

D. This product cannot be field trimmed unless noted otherwise.

3.03 CLEANING

A. Clean felt facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

B. Vacuum occasionally to remove any particulate matter and air-borne debris or dust. Compressed air can be used to dust the material in difficult to reach areas or for large assemblies.

3.04 PROTECTION

A. Provide protection of installed acoustical panels until completion of the work.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09 9100
PAINTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished (pre-finished) and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Exposed surfaces of steel lintels and ledge angles.
   3. Mechanical and Electrical:
      a. In all areas, paint gas piping only. See items scheduled NOT to be painted below.
      b. In all areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, to match face panels.

C. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished (pre-finished) unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
   7. Marble, granite, slate, and other natural stones.
   8. Floors, unless specifically so indicated.
   9. Ceramic and other tiles.
   10. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
   11. Brick, and cast stone.
   12. Exterior insulation and finish system (EIFS).
   13. Glass.
   14. Acoustical materials, unless specifically so indicated.
   15. Concealed pipes, ducts, and conduits.
   16. Door hinges, hardware, or fire door labels.
   17. Rusty or corroded surfaces until sandblasted or wire-brushed free of corrosion, and wiped clean.
   18. Mechanical and Electrical:
      a. In all areas, do NOT paint insulated and exposed pipes (except gas piping), conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 04 2000 - Unit Masonry Assemblies: Faces to be painted in this section.

C. Section 05 1200 - Structural Steel: Steel framing to be field painted.

D. Section 05 2100 - Steel Joist Framing: Steel joists to be field painted.

E. Section 05 3100 - Steel Decking: Prefinished steel decking to be protected from overspray during overhead painting operations.

F. Section 05 5000 - Metal Fabrications: Shop-primed items.

G. Section 07 0553 - Fire and Smoke Assembly Identification.

H. Section 08 1113 - Steel Doors and Frames: Shop-primed steel doors and frames.

I. Section 09 2116 - Gypsum Board Assemblies.

J. Section 09 9600 - High Performace Coatings: High performance coatings for exterior steel entrance canopy structure.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products and special coatings, including VOC content.
   1. List each material and cross reference to scheduled paint types, and including each specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples for initial color selection in the form of manufacturer's color charts from paint/coating manufacturer intended for use.

D. Samples: Submit two paper chip samples, 4x8 inch in size illustrating range of colors available for each surface finishing product scheduled.

E. Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

F. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

G. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

H. Applicator certifications that are required to be in writing.

I. Submit Manufacture Representative reports as outlined in Field Quality Control below.

J. Coating Maintenance Manual: Upon conclusion of the Project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as S-W "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product / color / finish was used, product data pages, Material Safety Data Sheet (MSDS), care and cleaning instructions, and Touch-up procedures.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

C. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by paint manufacturer, and use only within the recommended limits.

D. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify the Architect of any problems anticipated using the materials specified, prior to proceeding with work.

E. Material Quality: Provide the manufacturer's best quality grade paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
   1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude approved equivalent products of other manufacturers.

F. Location of Mock-Up shall be where directed. Mock-Up shall consist of complete application of coating system to full wall. Verify location with Architect before constructing.

G. Mock-Up: Provide mock-up at least 3 ft x 3 ft of general wall paint and trim for Architect's and Owner's review. Mock-Up guidelines as described in Section 01 4000 - Quality Requirements.

H. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

I. Lead content in pigments or other painting materials and components is not allowed.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, pigment and vehicle constituents by volume, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers, others present or passing through or inspecting work areas (painting or any other work), and the work areas themselves are protected from fire and health hazards resulting from handling, mixing, and application of materials.

1.09 PROJECT CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer, during application, drying and curing periods.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for solvent-thinned Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.10 MAINTENANCE MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Supply one (1) gallon of each color and type; store where directed.

C. Label each container with color, type, and room locations in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products from the same manufacturer to the greatest extent possible.

B. Paints:
1. Basis of Design: Sherwin-Williams: www.sherwin-williams.com.
2. Other Acceptable Manufacturers:
   a. Benjamin Moore & Co: www.benjaminmoore.com.
   b. PPG Architectural Finishes, Inc: www.ppgaf.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

C. Block Fillers: Same manufacturer as top coats.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
4. Supply each coating material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Architectural coatings VOC limits of State in which the project is located.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

D. Colors: As indicated on drawings
1. In all areas, finish pipes, ducts, conduit, and equipment the colors as indicated on drawings. Refer to Finish Legend.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint WE-TR-St - Wood, Stained.
1. Two Coats: S-W: Woodscapes Exterior Waterborne Semi-Transparent Polyurethane Stain, A15T5 (for vertical use).
2. Two Coats: S-W: SuperDeck S/T Waterborne Stain, 2650 Series.

B. Paint CppE-OP-3A - Concrete, Poured and Precast:
1. One Coat: S-W: Loxon Concrete & Masonry Primer, A24W8300, (<100 g/l voc).
2. Two Coats: S-W: SuperPaint Acrylic Exterior House Paint (Flat, A80-100 series) (Satin, A89-100 Series) (Gloss, A84-100 Series) - Architect to select finish required (<50 g/l voc).

C. Paint CE-OP-3A - Masonry, Opaque, (One filler coat and two acrylic finish coats):
1. One Coat: S-W: PrepRite Interior / Exterior Acrylic Block Filler, B25W25 (<50 g/l voc) (as required to be pinhole-free).
2. Two Coats: S-W: SuperPaint Exterior Acrylic House Paint, Gloss, A84-100 Series (<50 g/l voc).

D. Paint GEfibcem-OP-3A - Fiber Cement Board, Acrylic Primer and Paint, 3 Coat:
1. One Coat: S-W: Loxon Latex Primer, A24 (if unprimed).
2. Two Coats: S-W: A100 Exterior Acrylic House Paint, A82. More coats if needed to cover all fibering. Sheen: As selected from gloss or satin.

E. Paint GEsof-OP-3A - Gypsum Board Soffit (Glass-mat faced), Acrylic Primer and Paint, 3 Coat:
1. One Coat: S-W: Multi-Surface Interior/Exterior Acrylic Primer Sealer, B51W450.
2. Two Coats: S-W: SuperPaint Acrylic Exterior House Paint (Flat, A80-100series) (Satin, A89-100 Series) (Gloss, A84-100 Series) - Architect to select finish required (<50g/l voc).

F. Paint ME-OP-3A - Ferrous Metals, Unprimed, 100% Acrylic, 3 Coat:
1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 (<100 g/l voc).
2. Two Coats: S-W: Sher-Cryl High Performance Acrylic, Gloss, B66-300 (<200 g/l voc).

G. Paint ME-OP-2A - Ferrous Metals, Primed, Acrylic Latex, 2 Coat:
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
2. Two Coats: S-W: Sher-Cryl High Performance Acrylic, Gloss, B66-100 (<200 g/l voc).

H. Paint MgE-OP-3A - Galvanized Metals, Acrylic, Opaque, 3 Coat:
1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Metal Primer, B66-300 (<100 g/l voc).
2. Two Coats: S-W: Sher-Cryl High Performance Semi-Gloss, B66-350 (<200 g/l voc).

2.04 PAINT SYSTEMS - INTERIOR

A. Paint WI-OP-3A - Wood, Opaque, Acrylic Latex, 3 Coat:
1. One Coat: S-W: Multi-Purpose Interior / Exterior Latex Primer /Sealer, B51-450 Series (<50 g/l voc).
2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex EgShel Enamel, B20-2600 (0 g/l voc).

B. Paint WI-TR-VS - Wood, Transparent, Varnish, Stain:
1. Filler coat: S-W: As required.
2. One coat of stain; S-W: WoodClassics “250” Interior Wood Stain, A49-800 Series (<250 g/l voc). Option: S-W: MinWax “250” VOC Stain (<250 g/l voc).

3. One coat sealer; S-W: none required.
4. Two coats; S-W: WoodClassics Waterbased Polyurethane, A68 Series (<350 g/l voc). Option: MinWax Waterbased Polyurethane Varnish: Satin (710337), Semi-Gloss (710320), Gloss (710313) (<350 g/l voc).

C. Paint CppI-OP-3A - Concrete, Poured and Precast, Opaque, Acrylic, 3 coats.
1. One Coat: S-W: Loxon Concrete & Masonry Primer, A24W8300 (<100 g/l voc).
2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).

D. Paint CI-OP-3L - Masonry, Opaque, Latex, 3 Coat:
1. One Coat: S-W: Pro Industrial Heavy Duty Block Filler, B42W150. (Required to be pin-hole free).
2. Two Coats: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).

E. Paint MI-OP-3A - Ferrous Metals, Unprimed, Acrylic, 3 Coat:
1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-310 (<100 g/l voc).
2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).

F. Paint MI-OP-2A - Ferrous Metals, Acrylic Primed, Acrylic-Alkyd Finish, 2 Coat:
1. One Coat: Touch up with primer: S-W: Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-310 (<100 g/l voc).
2. Two Coats: S-W ProMar 200 Interior Waterbased Acrylic-Alkyd Semi-Gloss B34-8200 Series.

G. Paint MgI-OP-3A - Galvanized Metals, Acrylic, 3 Coat:
1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Primer, B66-310 (<100 g/l voc).
2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).

H. Paint CI-OP-3E - Concrete/Masonry [Inside Face of Single-Wythe Exterior Concrete Block Walls, and in Rest Rooms and other Wet Areas], Epoxy Enamel, 3 Coat:
1. One Coat: S-W: Kem Cati-Coat HS Epoxy Filler Sealer, B42W400. (Required to be pin-hole free) (Trowel to smooth finish may be required).
2. Two coats of waterborne epoxy polyamide (two-component, chemically-cured waterborne epoxy coating for use as a high performance architectural coating). S-W: Pro Industrial Water Based Catalyzed Epoxy (B73-300, Gloss) or (B73-360 EgShel). Architect to select finish required.

I. Paint GI-OP-3E - Gypsum Board, Epoxy, 3 Coat:
1. One coat of best commercial grade acrylic drywall primer, or as recommended by paint manufacturer. S-W: ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (0 g/l voc).
2. Semi-gloss: Two coats of S-W K46 Pro Industrial Precatalyzed Waterbased Epoxy. Scrub Resistance: 500-600 cycles per ASTM D 2486. MPI # 141, & 153, (145 g/L).

J. Paint GI-OP-3LA - Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:
1. One Coat: S-W: ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (0 g/l voc).
2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex EgShel, B20-2600 (0 g/l voc). (Where Sheen is indicated "Gloss", provide Pro Industrial™ High Performance Acrylic, B66-600 Series, <50 g/l voc).

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

E. All surfaces to be pinhole free.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

J. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

K. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

L. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

M. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

N. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's instructions.

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. All surfaces shall be pinhole-free.

G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

H. Sand wood and metal surfaces lightly between coats to achieve required finish.

I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

J. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Division 23 and 26 Sections for scheduling of color coding of equipment, duct work, piping, and conduit.

B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

B. Architect shall approve surface prior to finish coats being applied.

C. Manufacturers Representative shall visit the site a minimum of 3 times. These visits shall be at the beginning , middle and completion of work.
   1. The beginning visit shall review the substrate for compliance prior to installation and for appropriate use of products.
   2. The middle visit shall review the progress and performance of the installer.
   3. The final visit shall review the quality of the final product.
   4. The manufacturer shall submit reports to the Contractor and the Architect within 72 hours of each visit. The letter shall document observations, instructions to Contractor, and any remediations required and/or completed.

3.06 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean paint from all electrical devices, mechanical devices, door hardware, architectural items, and other permanent materials.

3.07 PROTECTION

A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

3.08 SCHEDULE - SURFACES TO BE FINISHED

A. See drawings for surfaces to be painted.

END OF SECTION

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SECTION 09 9600
HIGH PERFORMANCE COATINGS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes applying special coating systems to exposed exterior steel structure at the main entrance, as scheduled and/ or indicated.

B. Scope of this Section including surface preparation, prime coats (including shop applied primer), and topcoats for interior and exterior coatings.

C. Types of Special Coatings for interior and exterior use as indicated on the drawings and schedules include the following:
   1. Organic Zinc Rich Urethane: High Performance, Immersion grade, moisture cured urethane zinc rich primer.
   2. Epoxy: Two-component, high performance, polyamide epoxy or polyamine epoxy coating.
   3. Fluoropolymer Urethane: Two-component, high performance, thermoset solution fluoropolymer coating.

1.02 RELATED DOCUMENTS

A. Documents affecting work of this Section include, but are not limited to, General Conditions, Supplementary Conditions, Sections in Division 1 of these Specifications.

B. Section 05 1200 - Structural Steel Framing: Steel framing to receive high performance coating.

C. Section 09 9100 - Painting: General painting.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM B 117 Standard Test Method for Corrosion Resistance.
   2. ASTM D 2240 Standard Test Method for Measuring Shore Hardness.
   3. ASTM D 2794 Standard Test Method for Measuring Direct Impact.
   4. ASTM D 3359 Standard Test Methods for Measuring Adhesion by Tape Test.
   5. ASTM D 3363 Standard Test Method for Film Hardness by Pencil Test.
   6. ASTM D 4060 Standard Test Method for Abrasion Resistance.
   7. ASTM D 4213 Standard Test Method for Measuring Scrub-ability of Coatings.
   8. ASTM D 4258 Standard Practice for Surface Cleaning Concrete for Coating.
   9. ASTM D 4259 Standard Practice for Abrading Concrete.
   10. ASTM D 4261 Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
   11. ASTM D 4263 Standard Test Method for Indicating Moisture by the Plastic Sheet Method.
   12. ASTM D 4541 Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.
   13. And various other ASTM test standards.

B. Steel Structures Painting Council (SSPC):
   1. Steel Structures Painting Council Surface Preparation Specifications (SSPC-SP)
   2. Steel Structures Painting Council Paint Application Specifications (SSPC-PA)

1.04 DEFINITIONS

A. Definitions as used in Finish Schedule shown on Drawings and Coating Schedule included herein.
   1. Coatings: Paint or heavy duty finishes for use on surfaces subject to interior and exterior exposure, submergence, high moisture, splash, or chemical environment, including primers, sealers, fillers, and intermediate and finish coats.
   2. Normal: Surfaces subject to normal temperature and humidity.

3. First Coat: Field primer, factory primer, or shop primer. When only one coat is required, first coat is the finish coat.
4. Second, Third, Intermediate, or Finish coats: Successive finish coats applied over first coat.
5. DFT: Dry Film Thickness (Mils/coat).
6. Sfpg: Square feet per gallon (per coat).

1.05 SUBMITTALS

A. Product Data:
   1. Manufacturer's product data sheets, product performance criteria, generic chemistry of each coating, and application recommendations for each coating scheduled.
   2. List each material and cross-reference the specific coating, finish system, and application.

B. Submit one copy of manufacturer's Material Safety Data Sheets (MSDS) for each type of coating to Architect for information. Contractor shall post a copy of MSDS on the Site at all times when coating is in progress.

1.06 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. All coatings shall conform to OSHA requirements for allowable exposure to lead and other hazardous substances.

B. Product Manufacturer:
   1. Manufacturer shall be a company that specializes in producing high quality industrial coating materials. This company shall have 10 years or more experience demonstrated by case histories in the designated field of application.

C. Applicator Qualifications:
   1. Engage an experienced applicator with 5 years or more experience who has successfully completed coating system applications similar in material and extent to those indicated.

D. Single-Source Responsibility:
   1. Provide coating material produced by the same manufacturer for each system.

E. Performance Testing:
   1. The Owner/ Architect will require that any request for substitution will be accompanied by the performance requirements listed in Section 3.07.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.

B. Protect and heat or cool material storage location to maintain temperature ranges recommended by coating manufacturers, but not less than 50 degrees F.

C. Oily rags and waste must be removed from buildings each night or kept in appropriate metal containers. Provide fire extinguishers of the type recommended by coating manufacturers in areas of storage and where finishing is occurring. Allow no smoking or open containers of solvent.

D. Empty containers shall have labels canceled and clearly marked as to use.

1.08 PROJECT / SITE CONDITIONS

A. Environmental Requirements:
   1. Use indirect-fired dry heat and ventilate areas to obtain conditions recommended by coating manufacturer.
   2. Relative humidity conditions as specified by coating manufacturer shall be adhered to.

3. No unprotected, unheated exterior coating shall be undertaken when cold damp, foggy, or rainy weather appears probable, nor when the temperature of the substrate is below 50 degrees F, unless listed in this specification or approved in writing by the coating manufacturer.
4. Maintain the manufacturer's environmental requirements until the coating is fully cured.
5. Apply no coating in areas where dust is being generated.
6. Testing and disposal of any waste and coating shall be the responsibility of the CONTRACTOR.

B. Protection:
1. Drop cloths shall be provided in all areas where coating is performed to fully protect other surfaces.
2. Remove hardware, accessories, plates, lighting fixtures, and similar items or provide protection by masking. Upon completion, replace items or remove protection and clean.

C. Upon Substantial Completion, remaining unused material will become property of the OWNER. Seal material as required for storage, mark contents with color, type, location, and shelf life, and store on Site where required by the OWNER. Provide a minimum of two gallons of each system component and color used.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Tnemec Company, Inc.

B. Other Acceptable Manufacturers:
1. PPG Paints: www.ppgpaints.com.
2. Sherwin-Williams Company: www.protective.sherwin-williams/industries.

C. Substitutions: Section 01 6000 - Product Requirements.

2.02 SPECIAL COATING MATERIALS

A. Basis of Design: Special Coating products of Tnemec Company, Inc. are listed in the Coating Schedule as a standard of quality and performance. Technical information may be obtained from the following:
1. SteelCon Coating Systems, Inc.
2. 2100 3rd Ave South
3. Irondale, Alabama 35210
4. Phone: 205-951-2086
5. E Mail: rcrumbaugh@tnemec.com

B. Substitutions: See Section 01 6000 - Product Requirements.
1. Only coatings that meet or exceed the performance of these specified coatings may be submitted for use. Substitution requests shall include the name of the specified material for which a substitute is being requested; name of the proposed substitute material; and a complete description of the proposed substitute including performance & test data, cure times, recoat windows, and generic composition. No request for substitution will be considered that would decrease film thickness or offer a change in the generic type of coating specified or would be considered a change to the generic chemistry of the coatings specified.

2.03 COLORS, MIXING, AND THINNING

A. Color shall be formed of pigments free of lead, lead compounds, or other materials that might be affected by the presence of hydrogen sulfide or other gases likely to be present at the Site.

B. Where thinning is necessary, only the products of the manufacturer furnishing the coating will be allowed. All such thinning shall be done in strict accordance with the coating manufacturer's recommendations.

C. Mix in accordance with the manufacturer's recommendations.

2.04 SOURCE QUALITY

A. Source Quality: Obtain painting, coating, and thinning materials from a single manufacturer.

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical information, catalogue instructions, and product instructions listed on material containers.

3.02 EXAMINATION

A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the timely and proper completion of the work. Materials removed and replaced to correct defects due to errant application such as overspray or drips on unsuitable surfaces shall be at the Contractor's expense.

3.03 SURFACE PREPARATION

A. General:
   1. All surfaces to be coated shall be prepared as specified herein and in accordance with the coating manufacturer's recommendations. The object shall be to obtain a uniform, clean, and dry surface.
   2. Quality of surface preparation described herein is considered a minimum. If the coating manufacturer requires a higher degree of preparation, comply with the coating manufacturer's recommendations.
   3. Where surface dryness is questioned, test with a dampness-indicating instrument. Do not apply coatings over surfaces where moisture content exceeds that permitted by the coating manufacturer.
   4. Workmanship for surface preparation shall conform to the following Steel Structures Painting Council (SSPC) specification:
      a. SSPC-SP1
      b. SSPC-SP2
      c. SSPC-SP3
      d. SSPC-SP5
      e. SSPC-SP6
      f. SSPC-SP7
      g. SSPC-SP10
      h. SSPC-SP11
      i. SSPC-SP12

B. Ferrous Metal:
   1. New Steel: Prior to surface preparation all ferrous metals shall be cleaned of oil, grease and other contaminants in accordance with SSPC-SP 1 Solvent Cleaning. All surfaces shall be abrasive blast cleaned in accordance with SSPC-SP 10 Near White Blast Cleaning. Surface profile shall be 1.5 – 2.5 mils.

3.04 APPLICATION

A. Surfaces shall be dry at the time of application.

B. The minimum surface temperature shall be 50 degrees F and rising unless noted otherwise.

C. Apply in strict accordance with the manufacturer's recommendations by brush, roller, spray, or other application method. The number of coats and thickness required is the same regardless of application method.

D. Each coat shall be allowed to dry in accordance to the manufacturer's requirements. Drying time shall be construed to mean "under normal conditions." Where conditions other than normal exist, because of weather or because of confined space, longer times will be necessary.

E. Coatings shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Areas cut-in by brush prior to rolling shall have uniform appearance in comparison to adjoining surfaces.

F. Edges of coatings adjoining other materials or other colors shall be sharp and clean without overlapping.

G. Crevices and other hard to apply areas shall be back-rolled/back-brushed in conjunction with the field-applied prime coat.

H. Where multiple coats of the same material are applied, each undercoat shall be slightly different in shade to facilitate identifying each coat.

3.05 FINAL TOUCH-UP AND CLEANING

A. Prior to substantial completion, examine the coated surfaces and retouch or refinish surfaces to leave in condition acceptable to the ARCHITECT/OWNER.

B. Remove masking, coatings, and other material from floors, glass, and other surfaces not scheduled to be coated.

3.06 COATING SYSTEMS

A. Scheduled thickness or coverage rate is the minimum that will be accepted. Where thickness recommended my the manufacturer exceeds the minimum stated herein, comply with the thicker requirement.

B. Coatings shall conform to the following schedule and coating manufacturer's recommendations.

C. Ferrous structural steel shall be shop-primed. Field touch-up, where necessary, shall consist of surface preparation equivalent to what is specified and application of each coat that is in need of repair.

3.07 SCHEDULE OF COATING SYSTEMS FOR EXTERIOR SERVICE

A. *All coating thicknesses are expressed in dry film thickness (DFT.)

B. Exposed Structural and Architecturally Exposed Ferrous Metals:
   1. Provide the following finish systems over exposed structural steel at main entrance canopy and in main entrance lobby where identified:
      a. Shop Surface Preparation: SSPC-SP10 Near White Metal Blast Cleaning
      b. Shop Primer: Tnemec Series 90-97 Tneme-Zinc applied at a rate to achieve 2.5 – 3.5 mils dry film thickness. Prime coat shall meet the following performance criteria:
         1) Generic Type: Organic Zinc Rich Urethane Primer
         2) Solids By Volume: 63%
         3) Zinc Content: 83% by weight. ASTM D520 Type III Zinc Dust
         4) Salt Spray (Fog): ASTM B 117, Scribed Panels, 50,000 hours exposure.
         5) Adhesion: ASTM 4541 Elcometer Adhesion.
         6) Humidity: ASTM D 4585. 4,000 hours exposure.
         7) Cathodic Disbondment: ASTM G8, Method A. Days Exposure
         8) Immersion: ASTM D 870 Potable Water Immersion. 7 years immersion.
         9) Prohesion: ASTM G 85 Prohesion Cabinet. 15,000 hours exposure.

c. Field Touch-Up/Repair Surface Preparation: Shop applied primer damaged during shipping and erection shall be cleaned in accordance with SSPC-SP11 Power Tool Cleaning to Bare Metal. All edges shall be feathered. All surfaces shall be clean, dry and in a suitable condition to be coated.
d. Touch-Up/Repair Primer: Tnemec Series 90-97 Tneme-Zinc applied at a rate to achieve 2.5 – 3.5 mils dry film thickness. Prime coat shall meet the following performance criteria:
    1) Generic Type: Organic Zinc Rich Urethane Primer
    2) Solids By Volume: 63%
    3) Zinc Content: 83% by weight. ASTM D520 Type III Zinc Dust
    4) Salt Spray (Fog): ASTM B 117, Scribed Panels, 50,000 hours exposure.
    5) Adhesion: ASTM 4541 Elcometer Adhesion.
    6) Humidity: ASTM D 4585. 4,000 hours exposure.
    7) Cathodic Disbondment: ASTM G8, Method A. Days Exposure
    8) Immersion: ASTM D 870 Potable Water Immersion. 7 years immersion.
    9) Prohesion: ASTM G 85 Prohesion Cabinet. 15,000 hours exposure.
e. Intermediate Coat: Tnemec Series 66 Hi Build Epoxoline applied at a rate to achieve 4.0 – 6.0 mils dry film thickness. Intermediate coat shall meet the following performance criteria:
    1) Generic Type: Polyamide Epoxy
    2) Solids By Volume: 56%.
    3) Salt Spray (Fog): ASTM B 117. Result after 10,000 hours exposure (plane rust, rust at scribe and blistering).
    4) Immersion: ASTM D 870. 7 Years.
    5) Abrasion: ASTM 4060 (CS-17 Wheel, 1,000 gram load, 1,000 cycles)
    6) Adhesion: ASTM 4541 Elcometer Adhesion.
    7) Humidity: ASTM D 4585. 4,500 hours.
f. Finish: Tnemec 1070 Fluoronar applied at a rate to achieve 2.0 – 3.0 mils dry film thickness (Available in high gloss (1070), semi-gloss (1071) and eggshell (1072). Finish coat shall the following performance criteria:
    1) Generic Type: Thermoset Fluoropolymer Polyurethane
    2) Solids By Volume: 60%.
    3) Salt Spray (Fog): ASTM B 117, 10,000 hours exposure
    4) Adhesion: ASTM 4541 Elcometer Adhesion.
    5) Abrasion: ASTM 4060 (CS-17 Wheel, 1,000 gram load, 1,000 cycles)
    6) Flexibility: ASTM D 522 (Method A)
    7) Hardness: ASTM 3363.
    8) Humidity: ASTM 4585, 3,000 hours exposure
    9) Impact: ASTM B2794
    10) QUV: ASTM D 4587, 16,000 hours exposure.
    11) QUV: ASTM D 4587, 25,000 hours exposure.
    12) Exterior Exposure: ASTM D 4141, Method C (EMMAQUA), 1,500 MJ/m² Exposure. Report gloss retention and color retention.
    13) Exterior Exposure: ASTM D 4141, Method C (EMMAQUA), 2,000 MJ/m² Exposure. Report gloss retention and color retention.
    14) Exterior Exposure: ASTM D 4141, Method C (EMMAQUA), 5,000 MJ/m² Exposure. Report gloss retention and color retention.
    15) AAMA 2605 (10 Years South Florida Exposure):

3.08 COATING SYSTEM WARRANTY

A. The coating manufacturer shall provide to the Owner a 15 year warranty for the exterior coating system. The manufacturer shall warrant against (a) checking (b) cracking (c) blistering (d) delamination (e) color change as defined in the pre-approved warranty document (f) gloss change as defined in the pre-approved warranty document, and (g) chalking as defined in the pre-approved warranty document. To facilitate execution of the warranty, the Contractor shall provide the following:
   1. The painting contractor shall apply the intermediate and finish coat of the specified coating system to a minimum of 6 panels (to be supplied by Tnemec) of each finish color identified in the warranty.
   2. The panels shall be air dried for a minimum of 7 days and shipped to Tnemec Company prior to final acceptance of the work for verification color and gloss accuracy and for storage as the Original Project Color Standards for the duration of the warranty coverage.
   3. Tnemec shall forward the signed warranty document along with (2) two panels of each finish color to the Owner for retention by the Owner and (2) panels of each finish color to the painting contractor. These procedures are required to validate the warranty.
   4. All conditions of the product warranty shall be fulfilled by the contractor.

END OF SECTION

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SECTION 10 1100
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Porcelain enamel steel markerboards.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 06 2000 - Finish Carpentry: Wood frame and marker rails.

C. Section 09 2116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

D. Section 09 2216 - Non-Structural Metal Framing: Concealed supports in metal stud walls.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on porcelain enamel steel markerboard, trim, and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations , special anchor details.

D. Samples: Color charts for selection of color and texture of porcelain enamel steel markerboard and trim.

E. Samples: Two, 2 by 2 inches in size illustrating materials and finish, color and texture of porcelain enamel steel markerboard, tackboard surfacing, and trim.

F. Manufacturer's printed installation instructions.

G. Manufacturer's Qualification Statement.

H. Maintenance Data: Include data on regular cleaning, stain removal .

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 VISUAL DISPLAY UNITS

A. Porcelain Enamel Steel Markerboards:
   1. Manufacturers:

a. ASI Visual Display Products; _____: www.asi-visualdisplayproducts.com/#sle.
b. Claridge Products and Equipment, Inc; ____: www.claridgeproducts.com/#sle.
c. Nelson Adams NACO; ____: www.nelsonadamsnaco.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

2. Color: White.
3. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch .
4. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
5. Backing: Aluminum foil, laminated to core.
6. Size: As indicated on drawings.
7. Height: 48 inches.
8. Length: As indicated on drawings.
9. Frame: Extruded aluminum , with concealed fasteners.
10. Frame Finish: Anodized, natural.
11. Accessories: Provide marker tray and map rail.

2.02 ACCESSORIES

A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall , full width of frame.

B. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.

C. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

D. Cleaning Instruction Plate: Provide instructions for markerboard cleaning on a metal plate fastened to perimeter frame near marker rail.

E. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.

F. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

C. Verify flat wall surface for frameless adhesive-applied boards.

3.02 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Install with bottom of perimeter frame at 36 inches above finished floor.

C. Secure units level and plumb.

3.04 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Architect Punch.

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

B. Interior directional and informational signs.

C. Roof Identification Sign.

D. Emergency evacuation maps.

E. Building identification signs.

F. Dimensional Letters

G. Plaque.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Detail of Project Plaque in General Conditions section of Project Manual.

C. Section 04 2000 - Unit Masonry Assemblies.

D. Section 09 2116 - Gypsum Board Assemblies.

E. Division 22 & 23 - Mechanical Identification.

F. Division 26 - Electrical Identification.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

D. NFPA 170 - Standard for Fire Safety and Emergency Symbols; 2021

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information (including any graphic files needed) from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Architect prior to fabrication.

D. Shop Drawings: Submit shop drawings of each type of sign.
   1. Signage Plans: Provide floor plans compete with keyed location of each sign type.
   2. Signage Proofs: Provide paper proof set for all signs for approval by Owner / Architect prior to fabrication.

E. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

G. Verification Samples: Submit 1 sample of each type of sign, in finish as selected.

H. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

I. Manufacturer's Qualification Statement.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

K. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Trained and authorized by manufacturer for installations of required scope and product.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. If installation site is not ready for signage upon delivery, store signs and adhesive materials in a dry, air-conditioned environment.

D. Handle signage in accordance with manufacturer’s instructions.

1.07 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

1.08 WARRANTY

A. Product Warranty: Provide manufacturere's warranty against defects in materirals and workmanship for a period of one year.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Flat Signs (Exterior Doors, and Life Safety):
   1. Basis or Design: APCO Signs Elevate Series: www.apcosigns.com.
   2. Other Acceptable Manufacturers:
      a. TakeForm, Inc.: www.takeform.net.
      b. Best Sign Systems, Inc: www.bestsigns.com.
      c. Inpro: www.inprocorp.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Dimensional Letter Signs:
   1. Andco Industries Corp.
   2. Gemini, Inc.
   3. Leeds Architectural Letters, Inc.
   4. Substitutions: See Section 01 6000 - Product Requirements.

C. Plaques:
   1. Leeds Architectural Letters, Inc.

2. Andco Industries Corp.
3. Gemini Inc.
4. Substitutions: See Section 01 6000 - Product Requirements.

D. Exterior Building Identification Signs:
1. Andco Industries Corporation.
2. Cosco Industries: www.coscoarchitecturalsigns.com/#sle.
3. FASTSIGNS: www.fastsigns.com/#sle.
4. Inpro: www.inprocorp.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATION:

A. Accessibility Compliance: ADA Compliance: Sign system shall comply with all applicable provisions of the 2010 Standards for Accessible Design (the updated ADA Accessibility Guidelines, ADAAG), effective in March 2011 and ICC A117.1 and applicable building codes unless otherwise indicated. This includes requirements regarding which sign types require Braille/tactile features, character heights, raised character spacing, raised character stroke width, color contrast and installation locations and mounting heights within the facility.

B. Room, Directional, Informational, and Door Signs: Provide interior signage as indicated on the drawings.
1. Sign Type: Flat signs with engraved panel media as specified.
2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
3. Character Height: 1 inch unless indicated otherwise.

C. Interior and Exterior Door Signs: Provide a sign at every door and cased opening on Architect's drawings.

D. Interior Flat Signs:
1. Sign Type: Flat sign with acrylic or PETG panels.
2. Life Safety Signage: See drawings.
3. Roof Identification Sign: As described below.

E. Exterior Flat panel, exterior grade plastic laminate (in silver or aluminum color), or satin aluminum metal background, with raised black lettering. Sign size: 6" x 8", unless indicated otherwise on drawings.
1. Mount with mechanical fasteners.

F. Emergency Evacuation Maps:
1. Map content to be provided by Owner. Map graphics are to be provided by Signage Manufacturer.
2. Allow for minimum of five (5) Emergency Evacuation Maps, unless otherwise indicated on the drawings.
3. Mounting: Flush mounted.

G. Building Dimensional Letters:
1. Provide building identification sign as indicated on the drawings. Use metal components to match the exterior signage illustrated on the drawings.
2. Shop prime and field finish the sign as indicated, in color to be selected by Archtect.
3. Mount on exterior as indicated on drawings.

2.03 SIGN TYPE FEATURES:

A. Flat Signs: As indicated on the drawings.
1. Edges: Square.
2. Corners: Square.
3. Wall Mounting of One-Sided Signs: Tape adhesive.

4. Wall "Flag" Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.

B. Color and Font: Unless otherwise indicated:
1. Character Font: As indicated on drawings.
2. Character Case: Upper and lower case (title case).
3. Background Color: As scheduled.
4. Character Color: Contrasting color.

2.04 ROOF IDENTIFICATION SIGN

A. The General Contractor shall provide a sign 8"H x 16"W containing the following information"
1. Project Name.
2. Architect, with Phone Number.
3. General Contractor, with Phone Number.
4. Roof Installer, with Phone Number.
5. Roof Manufacturer, with Phone Number.
6. Roof Warranty Contact, with Name and Number.
7. Product of Roof (Make/ Model/ Color/ Thickness, etc.).
8. Roof Warranty Duration.
9. In-Service Date of Roof (Date of Substantial Completion).

B. The Roof Identification Sign shall be made of plastic laminate, and letters shall be engraved into sign as specified for door signage.

C. The Final Location of the Roof Identification Sign shall be in Janitor Closet. Coordinate with Architect and Owner.

2.05 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
1. Total Thickness: 1/16 inch.

2.06 DIMENSIONAL LETTERS

A. Metal Letters: Height and size as indicated on drawings. Letters shall be cast from 319 aluminum alloy and with annodized finish.
1. Metal: Aluminum casting.
2. Finish: As selected by Architect from manufacturer's aluminum anodized colors.
3. Font: As selected by Architect, with approval of Owner.
4. Size: 1" thick by height as indicated on drawings
5. Mounting: Concealed screws; flush mounting. With 3-inch stainless steel stand-offs, unless indicated otherwise

2.07 EXTERIOR BUILDING IDENTIFICATION SIGNS

A. Metal Letters and Forms:
1. Metal: Steel or Aluminum plate.
2. Metal Thickness: 3/8 inch minimum.
3. Text and Typeface:
   a. Character Font: To be selected.
   b. Character Case: To be selected.
4. Finish: Finish shall be per Section 09 9600 - High Performance Coatings.
5. Mounting: As indicated on drawings.

2.08 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

B. Tape Adhesive: Double sided tape, permanent adhesive.

C. Use clear silicone sealant.

D. For glass application provide backer on sign and clear silicone or tape for mounting.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs where indicated:
   1. If no location is indicated or space on latch side is limited, obtain Owner's instructions.

D. Interior Door Signs: Adhere in accordance with Manufacturer's recommendations.
   1. General: Installation locations shall be in accordance with ADA specifications. Locate signs where indicated using mounting methods in compliance with manufacturer's written instructions:
      a. The signage contractor shall coordinate installation schedules with the Owner.
      b. Installation shall be performed by manufacturer’s personnel trained and certified in manufacturer’s methods and procedures.
      c. The signage contractor shall submit a CAD generated location plan noting the location of all signage and cross referenced to message schedule or plots for architect’s approval.
      d. Installer to conduct a pre-installation survey prior to manufacturing to verify copy and sign location. Each location shall be noted using a low tack vinyl reproduction of actual sign. Full scale renderings of directories and directionals shall also be provided. Any location discrepancy or message issues shall be submitted to architect for review.
      e. Signs shall be level, plumb, and at heights indicated with sign surfaces free from defects.
      f. Upon completion of the work, signage contractor shall remove unused or discarded materials, containers and debris from site.

E. Exterior Door Signs: Mechanically fasten. Adhesive tape is not approved or acceptable.

F. Building Lettering: Mount letters onto building using the standard method recommended by the manufacturer for the type of surface indicated.
   1. Concealed Mounting: Unless recommended otherwise by manufacturer, mount the letters by inserting threaded studs into tapped lugs on the back of the letters. Set in pre-drilled holes filled with quick-setting cement.
      a. At cementitious cladding system, mount studs through cladding panel and into steel blocking.

3.03 PROTECTION

A. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid Plastic (HDPE) Toilet Compartments.

B. Urinal screens.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions of the Contract and Division 1 Specification Sections, apply to this Section.

B. Section 04 2000 - Unit Masonry: Wall construction.

C. Section 06 1000 - Rough Carpentry: Blocking and supports.

D. Section 10 2800 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 6x6 inch in size illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle compartments as recommended by manufacturer to protect from damage.

1.07 WARRANTY

A. Provide manufacturer's standard written warranty on its panels, pilasters, and doors against breakage, corrosion and delamination; to be replaced without charge, including labor.
   1. Period of warranty: Twenty five (25) year minimum.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. Accurate Partitions; "Solid Plastic (HDPE)":(Basis of Design) www.accuratepartitions.com.
   2. Scranton Products ; "Hiny Hiders Partitions": www.scrantonproducts.com.
   3. Substitutions: Section 01 6000 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted headrail-braced.
   1. Fire Rating:
      a. Must meet NFPA 286
   2. Color: Refer to Finish Legend.
   3. Doors:
      a. Thickness: 1 inch.
      b. Width: 24 inch.
      c. Width for Handicapped Use: 36 inch, out-swinging, unless drawings indicate otherwise.
      d. Height: 55 inch.
   4. Panels:
      a. Thickness: 1 inch (25 mm).
      b. Height: 55 inch.
      c. Depth: As indicated on drawings.
   5. Pilasters:
      a. Thickness: 1 inch (25 mm).
      b. Width: As required to fit space; minimum 3 inches (76 mm).

B. Screens: Without doors; to match compartments; mounted to wall with continuous stainless steel panel brackets with vertical support/bracing same as compartments, unless indicated otherwise.

2.03 MATERIALS

A. Solid plastic toilet partition: High density polyethylene (HDPE), 1-inch thick; with homogeneous color throughout. Waterproof, non-absorbent, graffiti resistant, and highly impact resistant.

2.04 ACCESSORIES

A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 3 in high, concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow stainless steel, 1 x 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.

C. Pilaster Brackets: Satin stainless steel.

D. Wall Brackets: Full height, continuous type, satin stainless steel.

E. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.

F. Hardware:
   1. Hinge: 14 gauge continuous, stainless steel, satin.
   2. Nylon bearings.
   3. Door Latch: Slide type with exterior emergency access feature, cast stainless steel; polished satin finish.
   4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch, cast stainless steel; polished stainless finish.
   5. Coat hook with rubber bumper; one per compartment, mounted on door, cast stainless steel, with polished satin finish.
   6. Provide door pull for outswinging doors, cast stainless steel; polished satin finish.

7. Accessible Toilet Compartments shall have self-closing door. Door pull shall be placed on both sides of the door near latch, and shall comply with 2010 ADA Standard 404.2.7. Door pull shall have a loop or U-shaped handle immediately below the latch on both sides of the door. Locking hardware shall be centered at 34" minimum above finished floor to 48" maximum above finished floor with 5 lbs maximum force, operable with one hand and requires no tight grasping, pinching or twisting of wrist.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

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SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

B. Section 06 1000 - Rough Carpentry.

C. Section 10 213.19 - Plastic Toilet Compartments.

1.02 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.
   1. Public-use washroom accessories.
   2. Underlavatory guards.
   3. Custodial accessories.

1.03 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Include electrical characteristics.

B. Samples: Full size, for each exposed product and for each finish specified.
   1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated.
   2. Identify products using designations indicated.

1.05 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from a single source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.08 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 OWNER-FURNISHED MATERIALS

A. Owner-Furnished Materials: The Owner will furnish the following items to be installed by the General Contractor:
   1. Toilet Tissue Dispensers.
   2. Paper Towel Dispensers.
   3. Soap Dispensers.

2.02 PERFORMANCE REQUIREMENTS

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.

2.03 MANUFACTURER

A. Basis-of-Design Products: Subject to compliance with requirements, provide the listed Basis-of-Design Products.
   1. Bobrick Washroom Equipment, Inc. (Basis-of-Design Product Manufacturer)
      a. Or comparable products by the following:
         1) Bradley Corporation (wash room accessories)
   2. Koala (Childcare Accessories Only)
   3. Plumberex (Underlavatory Guards Only)
      a. Or comparable products by one of the following:
         1) American Specialties, Inc.
         2) Bradley Corporation.
   4. Alternate products submitted for consideration (from one of the manufacturers listed above) must show an itemized comparison with each product named below.

PUBLIC-USE WASHROOM ACCESSORIES

3.01 TOILET TISSUE DISPENSER (STANDARD ROLL): TA01

A. OFCI - Install Per Owner Direction

3.02 PAPER TOWEL DISPENSER: TA10

A. OFCI - Install Per Owner Direction

3.03 WASTE RECEPTACLE, SURFACE MOUNT, LARGE: TA13

A. Basis-of-Design Product: Bobrick B-277

B. Mounting: Surface Mounted.

C. Minimum Capacity: 12.75 gallon.

D. Material and Finish: Stainless steel, No. 4 satin finish.

E. Waste Receptacle Profile: Arc-front.

F. Trash Liner Holder: Removable holding device designed to facilitate installation and removal of disposable trash liners and to retain liner inside waste receptacle. Device shall have a molded plastic sleeve with a stainless steel U-shaped support strap.

3.04 *SOAP DISPENSER, LIQUID TYPE, MANUAL: TA19*

A. OFCI - Install Per Owner Direction

3.05 GRAB BAR (SHORT): TA23

A. Basis-of-Design Product: Bobrick B-6806 x 18

B. Mounting: Flanges with concealed fasteners.

C. Material and Finish:
   1. Material: Stainless steel, 0.05 inch thick.
   2. Finish: Smooth, No. 4 satin finish on ends and slip-resistant texture in grip area.
   3. Outside Diameter: 1-1/2 inches.
   4. Configuration and Length: Straight, 18 inches long.

3.06 GRAB BAR (MEDIUM): TA24

A. Basis-of-Design Product: Bobrick B-6806 x 36

B. Mounting: Flanges with concealed fasteners.

C. Material and Finish:
   1. Material: Stainless steel, 0.05 inch thick.
   2. Finish: Smooth, No. 4 satin finish on ends and slip-resistant texture in grip area.
   3. Outside Diameter: 1-1/2 inches.
   4. Configuration and Length: Straight, 36 inches long.

3.07 GRAB BAR (LONG): TA25

A. Basis-of-Design Product: Bobrick B-6806 x 42

B. Mounting: Flanges with concealed fasteners.

C. Material and Finish:
   1. Material: Stainless steel, 0.05 inch thick.
   2. Finish: Smooth, No. 4 satin finish on ends and slip-resistant texture in grip area.
   3. Outside Diameter: 1-1/2 inches.
   4. Configuration and Length: Straight, 42 inches long.

3.08 MIRROR, FRAMED, WITHOUT SHELF: TA31

A. Basis-of-Design Product: Bobrick B-165-2436

B. Frame: Stainless steel channel.

C. Corners: Mitered, welded, and ground smooth.

D. Hangers: Produce rigid, tamper and theft-resistant installation, using one-piece, galvanized steel, wall hanger device with spring action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

E. Size: 24 inches wide x 36 inches high.

3.09 SANITARY NAPKIN DISPOSAL UNIT, SURFACE-MOUNT: TA36

A. Basis-of-Design Product: Bobrick B-254

B. Mounting: Surface mounted.

C. Door or Cover: Self-closing disposal opening cover and hinged face panel with tumbler lockset.

D. Receptacle: Removable.

E. Material and Finish: Stainless steel, No. 4 satin finish.

3.10 UNDERLAVATORY GUARDS

1. Underlavatory Guard: **TA58**
   a. Basis-of-Design Product: Plumberex Soft Guard Plus
   b. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
   c. Material and Finish: Antimicrobial, molded plastic, white.

3.11 CUSTODIAL ACCESSORIES

1. Mop and Broom Holder: **TA95**
   a. Basis-of-Design Product: Bobrick B-224 x 36
   b. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
   c. Length: 36 inches.
   d. Hooks: Three.
   e. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
   f. Material and Finish: Stainless steel, No. 4 satin finish.
      1) Shelf: Not less than nominal 0.05 inch thick stainless steel.
      2) Rod: Approximately 1/4-inch-diameter stainless steel.

3.12 MATERIALS

1. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
2. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
3. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
4. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
5. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
6. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
7. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
8. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

3.13 FABRICATION

1. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
2. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 10 keys to Owner's representative.

PART 3 EXECUTION

4.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

4.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer’s written recommendations.

END OF SECTION

SECTION 10 4300
EMERGENCY AID AND SECURITY SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Automated external defibrillator (AED) cabinets.

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Dovision 01 Specification Sections apply to this Section.

B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

C. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide color and finish, anchorage details, and installation instructions.

C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Maintenance Data: Include test schedules and recertification requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Emergency Aid Cabinets and Accessories:
   1. Basis of Design: Activar Construction Products Group, Inc. - JL Industries; LifeStart 1400 Series AED Cabinet: www.activarcpg.com/#sle.
   2. Other Acceptable Manufacturers:
      a. Modern Metal Products, a division of Technico, Inc: www.modern-metal.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EMERGENCY AID CABINETS

A. Type: Automated external defibrillator (AED).
   1. Provide one cabinet per building.

B. Cabinet Construction: Non-fire-rated.
   1. Formed aluminum base metal.

C. Cabinet Configuration: Semi-recessed type.
   1. Size to accommodate AED and bleeding control kit.
   2. Trim: Flat square edge, with 1 inch wide face.
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with wire pull handle and nylon catch. Hinge door for 180 degree opening with two butt hinges.

E. Door Glazing: Tempered glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.

F. Cabinet Mounting Hardware: Appropriate to cabinet, with predrilled holes for placement of anchors.

G. Fabrication: Weld, fill, and grind components smooth.

H. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.

2.03 ACCESSORIES

A. Cabinet Door Signage: "AED and Bleeding Control Kit" decal, or vinyl self-adhering, prespaced black lettering and identifying graphic in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openingsat elevation compliant with applicable Code and ADA.

C. Secure rigidly in place.

D. Owner will furnish and install Bleeding Control Kit and AEDs in cabinets.

E. Cabinet Lettering:
   1. Location: Face of glazing surface.

3.03 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust cabinet doors to operate smoothly without binding. Verify that alarms and integral locking devices operate properly.

C. On completion of cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes. Replace cabinets that cannot be restored to factory-finished appearance. Use materials and procedures recommended by cabinet manufacturer.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for closeout submittals.

B. See Section 01 7900 - Demonstration and Training for additional requirements.

C. Demonstrate proper operation of door security lockdown device to Owner's designated representative.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Secure Key Safe.

D. Accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Dovision 01 Specification Sections apply to this Section.

B. Section 04 2000 - Unit Masonry.

C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

D. Section 09 2116 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.

B. FM (AG) - FM Approval Guide; Current Edition.

C. NFPA 10 - Standard for Portable Fire Extinguishers; 2026.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com.
   3. Nystrom, Inc: www.nystrom.com/#sle.
   4. Potter-Roemer: www.potterroemer.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:
   1. Larsen's Manufacturing Co: www.larsensmfg.com.
   2. Nystrom, Inc: www.nystrom.com.
   3. Potter-Roemer: www.potterroemer.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Stored Pressure Operated: Deep Drawn.
   2. Class: A:B:C type.
   3. Size: 10 pound.
   4. Finish: Baked polyester powder coat, Red color.
   5. Temperature range: Minus 65 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated.
   1. Formed aluminum; 1/8 inch thick base metal.

C. Cabinet Configuration: Recessed type.
   1. Size to accommodate extinguisher and accessories.
   2. Trim: Flat square edge, with 1 inch wide face.
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with continuous piano hinge.

E. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.

F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

G. Fabrication: Weld, fill, and grind components smooth.

H. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.

2.04 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Cabinet Signage:
   1. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.

C. Place extinguishers in cabinets.

3.03 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

3.04 SCHEDULES

A. See drawings for locations of bracket suspended fire extinguishers and recessed cabined mounted extinguishers.

END OF SECTION

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SECTION 10 5100
LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lockers.

B. Locker units with hinged doors.

C. Metal tops and filler panels.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.

C. Shop Drawings: Indicate locker plan layout, including locker types, sizes and quantities. Include all necessary details related to anchoring, installation, fillers, trim, base, accessories, and dimensioned relation to adjacent surfaces.
   1. Numbering: The locker numbering sequence shall be provided by the approving authority and noted on approved drawings returned to the locker contractor.

D. Color Samples: Submit samples of all manufacturer's available paint colors on specified base metal (chain set) for Architect's color selection.

E. Verification Samples: If requested, submit two samples 3 x 6 inches in size, of each color selected; applied to specified base metal.

F. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.05 QUALITY ASSURANCE

A. Manufacturer shall be a firm with not less than 5 years of successful experience in manufacturing products specified in this Section.

B. Installer shall be a firm with not less than 5 years of successful experience in installation of products specified in this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until building is enclosed and ready for locker installation.

B. Protect locker finish and adjacent surfaces from damage.

1.07 WARRANTY

A. Provide manufacturer's warranty against all defects in materials and workmanship excluding finish, and damage resulting from deliberate destruction and vandalism under this section for the lifetime of the facility.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Lockers:
   1. Art Metal Products: www.artmetalproducts.com.

2. List Industries Inc.: www.listindustries.com.
3. Penco Products, Inc: www.pencoproducts.com.
4. Republic Storage: [Basis of Design] www.republicstorage.com
5. Substitutions: See Section 01 6000 - Product Requirements.

B. The approval of manufacturers does not relieve the contractor from furnishing products which comply with all detailed requirements of specification.

C. Manufacturers' products shall be standard cataloged items and shall be a consistently offered line of equipment. Manufacturers published literature must clearly show that the products being furnished are in compliance with these specifications. Otherwise a detailed listing of differences is required prior to bid.

2.02 LOCKER APPLICATIONS

A. Lockers S12: Double tier single point latch ventilated locker, wall and base mounted as indicated on drawings.
1. Width: 18 inches.
2. Depth: 24 inches.
3. Overall Height: 72 inches.
4. Locking: Single point latch.
5. Base: Pre-manufactured "Z" base.

2.03 METAL LOCKERS

A. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
1. Where ends or sides are exposed, provide flush panel closures.
2. Heavy Duty.
3. Construction: Welded.
4. Color: To be selected by Architect.

B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.

C. Sloped Top: 16 gage, 0.0598 inch. To be installed in addition to the locker flat top, with end closures for support. Finish to match lockers.

D. Coat Hooks: Stainless steel or zinc-plated steel.

2.04 MATERIALS

A. Fasteners: Cadmium, zinc or nickel-plated steel; bolt heads, slotless type; self-locking nuts or lock washers.

2.05 LOCKER UNITS

A. Athletic Lockers: Doors shall be 13 gauge steel, and perforated for ventilation. Handle shall be 3-point handle latching system. Tops, bottoms, shelves and dividers shall be 16 gauge, flanged on all sides for added stiffness. Sides shall be 16 gauge with diamond perforations. Exposed backs shall be 16 gauge and factory painted to match locker fronts. Unexposed backs shall be 18 gauge.

B. Locker Equipment: Furnish each locker with the following items, unless otherwise shown:
1. Double Tier Lockers: One double prong ceiling hook, and a minimum of two single prong wall hooks.
2. Ceiling and Wall hooks shall be cadmium plated or zinc plated steel or cast aluminum, with ball tips.

C. Base: "Z" Base.

D. Class: Conventional.

E. Locker Body: Formed and flanged; with steel stiffener ribs.

F. Frames: Formed channel shape, ground flush.

G. Door frames shall be 16 gauge steel channel formation securely welded together making a rigid one piece structure. Vertical members shall have an additional flange forming a continuous door strike, integral with frame on both sides of door opening. Cross frame members of 16 gauge channel shapes, including intermediate cross frame on multi-tier lockers, securely welded to vertical framing members to ensure a square and rigid assembly. Intermediate cross frame members not required on box lockers.

H. Continuous Hinges: Manufacturers heavy duty, steel, full height, 16 gauge. All doors shall be right hand side hinge.

I. Rubber bumpers shall be fastened to the vertical continuous door frame at each latch hook location to provide a cushion for door closing.

J. Number Plates: Provide oval shaped brass or aluminum plates. Form numbers 1/2 inch high of block font style with ADA designation, in contrasting color.
   1. Attach to door with two aluminum rivets.

K. Form recess for operating handle and locking device.

L. Finish edges smooth without burrs.

M. Fabricate sloped metal tops, ends and closure pieces.

N. Provide end panels and filler strips.

2.06 FABRICATION

A. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, safe to touch.

2.07 FINISHING

A. Clean, degrease, and neutralize metal; prime, and finish with two coats of baked enamel.
   1. Color: As selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.

B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and referenced standards.

B. Install lockers plumb and square.
   1. Units shall be set in place, plumb, level, rigid, flush and securely attached to the wall and anchored to the floor or base according to manufacturer's specifications.

C. Place and secure on specified base.

D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
   1. Anchor about 48" o.c., unless otherwise recommended by manufacturer. Also where necessary to avoid metal distortion, using concealed fasteners. Friction cups are not acceptable.

E. Bolt adjoining locker units together to provide rigid installation.

F. Install end panels, filler panels, and sloped tops.
   1. Attach using concealed fasteners. Provide flush, hairline joints against adjacent surfaces.

G. Install accessories.

H. Replace components that do not operate smoothly.

3.03 ADJUSTMENT

A. Upon completion of installation, inspect lockers and adjust as necessary for proper door operation. Touch-up scratches and abrasions to match original finish.

3.04 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 10 7316
METAL CANOPIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work in this section includes furnishing and installation of extruded aluminum canopy of the following types:
   1. Wall and Column Supported Type.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 03 3100 - Cast-in-Place Concrete.

C. Section 04 2000 - Unit Masonry: Masonry work.

D. Section 05 5000 - Metal Fabrications: Miscellaneous metals.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Sheet metal flashing.

F. Section 07 9005 - Joint Sealers: Sealants.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2005.

B. Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.A.

C. ASCE 7, Minimum Design Loads for Buildings and Other Structures.

D. American Architectural Manufacturer's Association (AAMA).

E. American Society for Testing and Materials (ASTM).

F. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.

G. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

H. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 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.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's product information, specifications and installation instructions for building components and accessories.

C. Shop Drawings: Indicate all necessary plan dimensions, elevations and details. General Contractor shall verify all dimensions and provide elevations at each column, finish floor, and related soffit before releasing to manufacturer for fabrication.

D. Certification: Submit design calculations signed by a Registered Professional Engineer, licensed in Alabama. Design calculations shall state that the canopy system complies with the wind requirements of ASCE 7-95, the applicable building code, and all other governing criteria.

E. Certificate: Certify that products of this section meet or exceed specified requirements.

F. Warranty: Submit manufacturer's warranty (as described below) and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Perform design 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.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience, and approved by manufacturer.

D. Wind Uplift: Provide roof and vertical panel systems including supports meeting requirements of Underwriters Laboratories, Inc. for wind uplift resistance as indicated in the Structural Drawings and as required by applicable Code.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store all canopy components in protected areas.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Canopy system, including materials and workmanship, shall be warranted from defects for a period of one year from substantial completion of installation.

C. Provide 10 year manufacturer warranty for canopy system remaining intact (without perceptible deformation) and completely leak-free for 10-years from date of acceptance of project (this warranty need not cover damage from winds exceeding the velocities and/or loading required by the International Building Code).

D. Provide 10 year manufacturer warranty covering finish of canopy when finished with fluoropolymer coating.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Wall and Column Supported Canopy System:
   1. Architectural Shade Products: www.architecturalshade.com.
   2. Mitchell Metals: www.mitchellmetals.net.
   3. Superior Mason Products LLC: www.superiormetalproducts.com.
   4. Tennessee Valley Metals, Inc.,: www.tvmetals.com.
   5. Peachtree Protective Covers, Inc: www.peachtreecovers.com
   6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Structural Components (including but not limited to decking, beams, posts, fascia, channels, tubes, angles, mounting plates and hanger rods) shall be extruded aluminum, alloy 6063-T6.

B. Fasteners: aluminum, 18-8 stainless steel or 300 series stainless steel.

2.03 COMPONENTS

A. Columns shall be radius-cornered tubular extrusion of size indicated (4" square minimum), with cutout and internal diverter for drainage where required.

B. Beams shall be open-top tubular extrusion of size and shape indicated, top edges thickened for strength and designed to receive deck members in self-flashing manner. Provide structural ties in tops of all beams.

C. Channels, Tubes, Angles, Hanger Rods, and Mounting Plates: Structural aluminum extrusions.

D. Deck shall be extruded self-flashing sections interlocking into a composite unit.

E. Fascia shall be size and shape as indicated.

F. Flashing shall be .040" aluminum (min.).

2.04 FABRICATION (COLUMN-SUPPORTED TYPE)

A. Columns and gutter beams shall be designed such that the columns will be notched to receive and secure the gutter beams.

B. Support channels and beams shall be designed to receive and secure the gutter beams.

C. Beams and Columns shall be positively connected with neatly mitered corners.

D. Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Assemble deck with sufficient camber to offset dead load deflection.

E. Concealed drainage: Water shall drain from covered surfaces into integral gutter beam and be directed to ground level discharge via one or more designated support posts.

2.05 FABRICATION (WALL-SUPPORTED TYPE)

A. Canopy shall use perimeter extruded gutter and extruded decking.

2.06 FACTORY FINISHING

A. 70% Fluoropolymer (Kynar) finish: AAMA 2605, three coat.

B. Color: Selected from manufacturer's standard colors.

2.07 ACCESSORIES

A. Splash Pads: Precast concrete type, size and profiles indicated. (Standard profile, if not indicated.) minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready to receive work.

3.02 PREPARATION

A. Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

B. Any blocking necessary to install wall supported canopy shall be in place and installed according to approved shop drawings prior to canopy installation.

3.03 INSTALLATION

A. Installation shall be in strict accordance with manufacturer's recommendations and approved shop drawings.

B. Blockouts, if required, shall be provided by manufacturer, and installed by General Contractor.

C. Erect columns and beams true to line, level and plumb.

D. All fasteners penetrating building face shall be sealed.

E. Canopies shall be installed with slope of 1/8" per foot for water to drain from top of canopy to draining scuppers/downspouts and eliminate ponding.

F. All exposed fasteners shall be painted to match canopy color.

G. Decking shall be aligned and secured to aluminum frame structure.

H. Install in accordance with manufacturer's instructions.

I. Set splash pad under each downspout column outlet.

3.04 TOLERANCES

A. Maximum Variation From True Position: 1/2".

B. Maximum Offset From True Alignment: 1/4" in 10' - 0".

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.06 CLEANING

A. After installation, entire system shall be left in a clean condition.

3.07 PROTECTION

A. Protect the finish during handling and erection.

B. Take all precautions needed to protect entire canopy system from damage during subsequent construction activity until time of Substantial Completion.

C. Do not permit traffic on canopy roof assemblies without approval of the canopy installer and manufacturer.

3.08 MAINTENANCE

A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.

END OF SECTION

SECTION 12 2414
ROLLER WINDOW SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manually operated double-roller sunscreen and room-darkening shades.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 06 1000 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

C. Section 09 2116 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

1.03 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.
   5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

F. Mock-Up: Provide a mock-up (for both manual and electrical shades) of one roller shade assembly for evaluation of mounting, appearance and accessories.
   1. Locate mock-up in window designated by Architect.
   2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.08 WARRANTY

A. Shade Fabric: Manufacturer's 10-year warranty.

B. Roller Shade Hardware, and Chain: 5 years warranty against defects in materials and workmanship.

C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Caco, Inc.

B. Draper, Inc.; "Access FlexShades" [Basis of Design]: www.draperinc.com.

C. MechoShade Systems, Inc. www.mechoshade.com.

D. Substitutions: Section 01 6000 - Product Requirements.

2.02 SHADE CLOTH

A. Light-Filtering Fabrics:
   1. SheerWeave Series SW2900 Series by Phifer: VOC Emissions: GREENGUARD and GREENGUARD Gold - certified as a low-emitting fabric. Composition: 38% Fiberglass, 62% Vinyl on Fiberglass. Fire rating: NFPA 101 (Class A Rating). Bacteria and Fungal Resistance: ASTM E 2180; ASTM G 21AATCC30 Part 3; ASTM D 3273; GREENGUARD Mold and Bacteria Standard ASTM 6329. Include Microban antimicrobial additives. Mesh Weight: 14.1 oz/sq yd. Openness Factor - Approx. 3 percent. UV Blockage - Approx. 95 Percent. Fabric thickness: 0.022 inches.

B. Color and Pattern: As selected by Architect from manufacturer's standard range.

2.03 MANUAL WINDOW SHADES

A. Roller Shades -
   1. Description: Single roller. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation. Includes aluminum housing with installation to be coordinated with ceiling system installation. Provide brackets, fasteners, and other components necessary for complete installation.
      a. Provide universal drive capability to offset drive chain.
      b. Drop Position: Regular roll.
      c. Mounting: As indicated on drawings.
   2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated. Provide shade hardware constructed as required to support 150 percent of the full weight of each shade.
      a. Material: Steel, 1/8 inch thick. Do not use styrene-based plastics, polyester, or reinforced polyester.
   3. Roller Tubes:
      a. Provide with roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin to allow easy installation and removal of roller.
      b. Material: Extruded aluminum or steel.
      c. Size: As recommended by manufacturer for installation conditions, span, and weight of shades.
      d. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
      e. Capable of removal and reinstallation without affecting roller shade limit adjustments.
   4. Hembars: Designed to maintain bottom of shade straight and flat.
      a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
   5. Clutch Operator: Manufacturer's standard material and design integrated with bracket and brake assembly. Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Provide limit stops to prevent shade from being raised or lowered too far.
      a. Provide permanently lubricated brake assembly mounted on oil-impregnated hub with wrapped spring clutch.
      b. Provide brake capable of withstanding minimum pull force of 50 pounds in stopped position.
      c. Mount clutch and brake assembly on support brackets, fully independent of roller tube components.
   6. Drive Chain: Continuous loop, stainless steel beaded ball chain, 100 pounds minimum breaking strength. Provide upper and lower limit stops.
      a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
   7. Accessories:
      a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; anodized aluminum finish to match adjacent window framing.
         1) Provide fascia capable of installation across two or more shade bands in one piece.
         2) Single Fascia: Accommodate regular roll shades.
         3) Profile: Square.
         4) Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.

5) Endcap covers to match fascia/headbox finish.
6) Shade slat: Slat encased in heat seamed hem.
7) Headbox Ceiling/Wall Style: Aluminum fabrication with removable closure, endcaps, and back and top cover piece:
   (a) Finish: Powder coat color as selected by Architect.

2.04 ACCESSORIES

A. Roller Shade Pocket for recessed mounting in acoustical tile, or drywall ceilings where indicated on the Drawings.
   1. Provide either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
      a. Provide "Vented Pocket" such that there will be a minimum of four 1 inch (25.4 mm) diameter holes per foot allowing the solar gain to flow above the ceiling line.

B. Fascia, where required for non-recessed mounting:
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
   5. Notching of Fascia for manual chain shall not be acceptable.

PART 3 - EXECUTION

3.01 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.

3.02 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.

3.03 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.04 TESTING AND DEMONSTRATION

A. Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.

B. Test motorized window shades to verify that controls, limit switches, interface to other building systems, and other operating components are functional. Correct deficiencies.

C. Demonstrate operation of shades to Owner’s designated representatives.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 12 3219
LAMINATE CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

A. The General Contractor, at its option, may furnish and install Custom Architectural Woodwork (Millwork) in lieu of the Casework specified in this Section. See Section 06 4000 - Custom Architectural Woodwork for requirements.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Special Conditions and Division 1 - Specification sections, apply to work of this section.

B. Section 06 1000 - Rough Carpentry.

1.03 WORK INCLUDED

A. The extent of manufactured casework systems as shown on drawings, schedules, and specified herein. Where specific materials, finishes, construction details, and hardware are specified herein, the casework contractor shall be held in strict accordance. All items shall be as provided, and publicly cataloged, by the manufacturers to assure physical and dimensional integrity of the system and ready access to additional systems components for a minimum of ten (10) years after completion of this contract. Product from companies not meeting this requirement will not be accepted. It is the intent of the owner and architect and construction manager to have this specification section furnished by one contractor.

B. Furnish and install all fixed, modular, and mobile laminate clad casework, tops and accessories and components, fillers and related items shown on drawings and herein specified. All built-in and modular plastic laminate counter tops and splashes are specified herein and detailed on architectural.

C. Furnish and install all locks for cabinet doors and drawers as indicated on elevations of the architectural drawings.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain entrance mats, grates, and frames from a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing specified mats and grates with minimum three years documented experience.

C. Installer Qualifications: Company specializing in installing mats and grates with minimum three years documented experience and approved by carpet tile manufacturer.

D. Flammability in accordance with ASTM E648, Class I, Critical Radiant Flux minimum 0.45 watts/ SM.

E. Slip Resistance: Per ASTM D 2047-96, Coefficient of Friction 0.60 when wet, or better.

1.05 RELATED WORK SPECIFIED ELSEWHERE

A. Division 6 - Coordination of all in-wall blocking.

B. Sinks and service fixtures, service and waste lines and all connections, vents, electrical service fixtures, hoods and ducting within or adjacent to casework, or otherwise required in all areas: Furnished and installed under Mechanical and Electrical Divisions 21 through 26.

C. Base molding: Furnished and installed under Finishes Division 9, to be consistent with base molding in room, unless base is not specified, in which case laminate base shall be applied.

D. Appliances, unless specifically noted on plans as included in this section.

E. Furnishing, installing and connecting of service supply lines and conduits within equipment and reagent racks, connecting of exposed service lines, connecting of services in tunnels or service turrets through, under, or along backs of working surfaces as required for utility service fixtures.

F. Installing all utility service outlet accessory fittings and fixtures furnished by casework contractor, pulling of wire and connecting of electrical fixtures in service lines, provision of ground fault protection for circuits requiring such.

G. Receiving, installing and connecting all separate sinks, cup sinks or drains, draining troughs, overflows and sink outlets, as furnished by the casework contractor for the Work Room and Storage Room areas.

H. Furnishing, installing and connecting all traps, tailpieces, backflow prevention devices and special plumbing fittings and piping of unusual nature to meet local codes even though not specifically called for in specifications or shown on drawings.

I. Furnishing and installing of all framing, bucks, metal grounds or reinforcements in walls, floors, ceilings to adequately support and anchor casework and related equipment.

J. Furnishing fluorescent tubes, light bulbs and any miscellaneous materials generally classified as maintenance or supply items.

K. Furnishing and installation of all rigid or flexible conduit, wire, pulling of wire, fittings, special electrical equipment, data, and accessories including boxes, receptacles, and flush plates required at reception desk.

L. Coordination with millwork items as specified in Section 06 4000 - "Architectural Woodwork".

1.06 SYSTEM DESCRIPTION

A. All manufactured casework shall be pre-engineered, and cataloged in a nationally published catalog. Manufacturers submitting for approval must provide printed catalog information documenting this performance feature; no exceptions will be allowed.

1.07 QUALITY ASSURANCE

A. 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

B. All manufacturers herein listed, shall show evidence of a minimum of five (5) years experience in providing manufactured casework systems for similar types of projects.

C. Manufacturer shall produce evidence of adequate facilities and personnel required to perform on this project. Financial stability of manufacturer shall be evidenced by readily providing a material performance bond if required.

D. Manufactured casework systems must conform to design, quality of materials, workmanship and function as shown on drawings and specified herein. In the absence of a printed specification, minimum quality standards shall be in accordance with AWS Section 10 & Section 11, 1st Edition, Oct. 2009, no exceptions will be permitted; additional requirements shall be as specified herein.

E. Provide independent laboratory testing documenting that the support rail and interfacing components when tested in strict accordance with the requirements of seismic construction codes, all components met or exceeded the requirements as set forth by the codes. All casework bidders must provide a copy of test to architect ten days prior to bid date.

F. All casework bidders must provide the following test results as tested by an independent testing firm:
   1. Racking Test (must exceed 975 lbs.)
   2. Front Joint Load Test (must exceed 635lbs.)
   3. Uniform Load Shelf Test (must exceed 1140 lbs.)

4. Isolated Shelf Clip Load Test (must exceed 640 lbs.)
5. Static Load Test (must exceed 1800 lbs with no cabinet failure)
6. Draw Side Joint Test (must exceed 425 lbs.)
7. Draw Front Joint Test (must exceed 925lbs.)
8. Draw Static Load Test (must exceed 900 lbs.)

G. The architect and owner reserves the right to randomly select one 36” wide base cabinet and one 36” wide wall cabinet and one 36” wide tall cabinet from each manufacturer during installation and cut apart to determine if the product installed meets the written specification. The casework manufacturer shall include the price to replace these units in his bid. If the product fails to meet the specification then the casework supplier shall be responsible to make any and all necessary corrections.

1.08 SUBMITTALS

A. Product Data:
1. In addition to the general conditions as relates to prior approvals, submittals of manufacturer's data, installation instructions, and samples are required upon architect's request.

B. Samples:
1. Submit samples of specified decorative laminate colors, patterns, and textures for exposed and semi-exposed materials for architect's selection. See drawings.
2. Submit samples of hardware.
3. Architect may request representative full-size samples for evaluation prior to approval. Samples may be impounded by architect/owner until completion of project to ensure compliance with specifications.
4. Submit copy of Seismic testing report.

C. Production Drawings:
1. Submit production drawings for all casework systems and countertops and required equipment showing plans, elevations, ends, cross-sections, service run spaces and location of services.
2. Include layout of units with relation to surrounding walls, doors, windows, and other building components. Include finish and hardware schedule.
3. Coordinate production drawings with other work involved.

1.09 PRODUCT HANDLING

A. Deliver casework and countertops only after wet operations in building are completed.

B. Store completed casework and countertops in a ventilated place, protected from the weather, with relative humidity range of 20% to 50%.

C. Protect finished surfaces from soiling and damage during handling and installation.

D. General Contractor shall be responsible for protection of all casework and tops after installation is completed.

1.10 JOB CONDITIONS

A. Humidity and Temperature Controls:
1. Before the delivery and installation of casework and equipment, building conditions shall be as follows:
a. The building shall be secure and weather tight, with windows and doors installed, heat and air conditioning systems functional.
b. 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.

c. Flooring required to be placed under casework and equipment must be installed.
d. 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.
e. General Contractor shall have heat and air conditioning systems providing consistent temperature and humidity conditions as required Related humidity must be maintained at not less than 25%, nor more than 55%. Temperatures must not range lower than 65 degrees F, not to exceed 80 degrees F in areas of material installation.
f. All overhead mechanical, electrical or plumbing rough-in work shall be complete
g. Any “wet” operation performed by other trades must be complete prior to delivery.
h. Ceiling grids (with or without ceiling tiles), overhead soffits, duct work and lighting shall be installed.
i. Painting shall be complete.
j. General Contractor shall provide a secure storage area within the building that is clean, dry well ventilated, protected from direct sunlight and broom clean.

1.11 WARRANTY

A. The manufacturer shall guarantee all materials and workmanship of equipment provided in this contract for a period of five years from date of final acceptance. This is a warranty of replacement and repair only, whereby the manufacturer will correct defects in materials and/or workmanship without charge. Any defective materials of faulty workmanship occurring within that time shall be replaced or corrected promptly without charge upon notification by the owner or his designated representative. All bidders are to provide to the Architect a copy of the manufacturers warranty for the casework ten (10) days before the bid date.

PART 2 – PRODUCTS

2.01 PLASTIC LAMINATE CASEWORK

A. Manufacturers: Subject to compliance with specifications, provide products by one of the following:
   1. Casework Systems:
      a. TMI Systems Design Corporation.
      b. Case Systems, Inc.
      c. LSI Corporation of America, Inc.
      d. Stevens Industries, Inc.
   2. Plastic Laminate: Provide products from manufacturers listed on Finish Legend.

B. Substitutions:
   1. It is the intent of this specification to establish performance and quality criteria consistent with pre-established standards of design and function herein described. Casework systems not meeting these minimum standards will not be accepted.
   2. Where specific materials, finish options, construction details, modularity, hardware and test data are specified herein, the casework storage system will be held in strict compliance. Substitutions will be considered prior to bid date provided request is submitted to the architect, in writing, no later than ten (10) days prior to bid date; substitution request shall list any and all deviations from this specification. Requests later than ten (10) days prior to bid will not be considered. Acceptable substitutions will be identified in future addenda.
   3. All manufacturers must submit the following items to the architect ten days prior to bid date to be qualified to bid.
      a. A Copy of required Seismic Testing Data related to rail casework.
      b. ADA Brochure depicting ADA requirements and compliance
      c. All required independent test reports.
      d. A sample base cabinet of fixed base cabinet with required hardware.
      e. A copy of Guarantee and Limited Warranty.

f. A detailed deviation list addressing where the requested product deviates from the specified product.

2.02 MATERIALS

A. Core Materials:
   1. MR Moisture Resistant Medium Density Fiberboard: Average 47-pound density grade, ANSI A 208.2.
   2. Medium Density Fiberboard: Average 47-pound density grade, ANSI A 208.2.
   3. Grade AB Plywood

B. Hardboard: 1/4 inch thick prefinished hardboard, CS-251.

C. Decorative Laminates:
   1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-1995. for vertical surfaces.
   2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-1995 for horizontal Surfaces.
   3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-1995 for post formed tops.
   4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-1995.
   5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-1995.
   6. Thermally fused melamine laminate, NEMA Test LD 3-1995.

D. Laminate Color Selection: See Finish Legend for color selection.

E. Edging Materials:
   1. 1 mm PVC banding.
   2. 3mm PVC banding, machine profiled to 1/8 inch radius, where required and herein specified.
   3. Finish: To be selected.

F. Grommets:
   1. 2-1/2" x 6" rectangle grommet - equal to Mocket #RG3-P3. See Drawings for location.

2.03 SPECIALTY ITEMS

A. Metal Parts:
   1. Countertop support brackets, undercounter support frames, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and epoxy powder painted. Color shall be as selected by Architect from manufacturer's standard colors.
      a. Support brackets shall be equal to Rakks EH Counter Support Bracket unless otherwise noted.
         1) For concealed support, provide Inside Wall-Flush Mount bracket.

2.04 CABINET HARDWARE

A. Hinges:
   1. Furnish 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.
   2. Doors 48 inch and over in height shall have 3 hinges per door.
   3. Provide a magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustments.

B. Pulls:
   1. Wire pulls equivalent to Stanley No. 4484, stainless steel, satin finish (ANSI B12012), 4-inches long, with 1-inch clearance; finish to match Section 08710 - "Finish Hardware" finish in room(s) where occurs. Pull design shall comply with the Americans with Disability Act (ADA).

C. Drawer Slides:
   1. Regular, knee space and pencil slides shall be 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers and have a positive stop both directions with self-closing feature. Paper storage units shall have 150-pound load rated epoxy coated steel slides.
   2. File: Full extension, Shall have 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers and have positive stop both directions with self-closing feature.

D. Adjustable Shelf Supports:
   1. Injection molded transparent polycarbonate friction shall fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support shall have 2 integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support shall automatically adapt to 3/4 inch or 1 inch thick shelving and provide a 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. Shall be standard removable core, disc tumbler, cam style lock for drawer with strike. Furnish 2 keys.

F. Coat Rods: Shall be 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.

G. File Suspension System: Shall be 14-gauge steel file suspension rails, epoxy powder coated. File followers, or other split bottom hardware, will not be acceptable.

2.05 FABRICATION

A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown.

B. Cabinet Body Construction:
   1. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals.
   2. Minimum 6 dowels each joint for 24 inch deep cabinets and a minimum of 4 dowels each joint for 12 inch deep cabinets.
   3. Tops, bottoms and sides of all cabinets are 3/4 inch thick particleboard core.
   4. Cabinet backs: 1/2 inch thick. Wall and tall cabinets are provided with a 1-inch x 1-3/4 inch PVC mounting strip used to secure the cabinet to the wall.
      a. Exposed back on fixed or movable cabinets: 3/4 inch particleboard with the exterior surface finished in VGS laminate as selected.
      b. Flexible rail mounted cabinet backs: 3/4 inch thick particleboard structurally doweled into cabinet sides and top panels.
   5. Fixed base and tall units have an individual factory-applied base, constructed of 3/4 inch exterior grade plywood. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawing.
   6. Base units, except sink base units: Full sub-top. Sink base units are provided with open top, a welded steel/epoxy painted sink rail full width at top front edge concealed behind face rail/doors, a split back removable access panel.
   7. 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.
   8. Exposed and semi exposed edges.
      a. Edging: 1mm PVC

9. Adjustable shelf core: 1 inch thick particleboard up to 36 inches wide, 1-inch thick particleboard with corrugated metal ribbed stiffener for shelves over 36 inches wide.
    a. Front edge: 1mm PVC.
10. Interior finish, units with open Interiors:
    a. Top, bottom, sides, horizontal and vertical members, and adjustable shelving faces with VGS High Pressure decorative laminate. Match exterior finish.
11. Interior finish, units with closed Interiors:
    a. Top, bottom, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine laminate with matching prefinished back. Color to be selected by Architect.
12. Exposed ends:
    a. Faced with VGS high-pressure decorative laminate.
13. Wall unit bottom
    a. Faced with thermally fused melamine laminate.
14. Wall and tall unit tops:
    a. Top surface is faced with thermally fused melamine laminate.
15. Balanced construction of all laminated panels is mandatory.
16. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), not permitted.
17. Provide specified grommets in bracket supported countertops. 1 per 5'-0" of countertop. Locations to be determined by Architect.

C. 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 1mm PVC. Full height sides.
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.

D. Door/Drawer Fronts:
1. Core: 3/4 inch thick particleboard.
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.
4. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

E. Miscellaneous Shelving: Location: Classroom storage closets.
1. Core material: 3/4 inch or 1 inch particleboard, as required.
2. Exterior & Interior: VGS High-pressure decorative laminate.
3. Edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

PART 3 - EXECUTION

3.01 INSPECTION

A. The casework contractor shall 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 unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 EXAMINATION

A. Verify existing conditions under provisions of Section 01 7000.

B. Verify that openings are ready to receive work.

C. Verify adequacy of support framing anchors.

D. Verify that required utilities are available. In proper locations and ready for use.

E. Beginning of installation means installer accepts existing surface conditions.

3.03 INSTALLATION

A. Install casework, components and accessories in accordance with manufacturer's instructions.

B. Use anchoring devices to suit condition and substrate materials encountered.

C. Set casework items plumb and square.

D. Install casework attachment rails on wall along entire length of wall to facilitate installation of wall cabinets.

E. Hang wall mounted casework on attachment rails. Level and adjust wall casework using adjustment capabilities of wall unit mounting brackets.

F. Assemble and install worksurface tops on site with use of concealed screws on bases such as base cabinets, pedestals or columns

G. Scribe to abutting surfaces and align adjoining components. Apply matching filler pieces where caseworks abuts dissimilar construction.

H. Repair small scratches and surface blemishes on units using manufacturer's supplied touch up materials. Replace damaged cabinets or materials if directed by Architect.

3.04 ADJUSTING

A. Adjust work under provisions of Section 01 7000.

B. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

3.05 CLEANING

A. Clean work under provisions of Section 01 7000.

B. Clean casework, counters, shelves, glass, legs, hardware, fittings, and fixtures.

C. Remove dirt with damp cloth and soap and water. Remove stubborn dirt with non-flammable chlorinated solvents or solvents such as: lacquer thinner, M.E.K., or contact adhesive solvent if area is ventilated sufficiently to prevent build-up of fumes and noticeable odors. Do not use harsh abrasive cleaners.

3.06 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01 5000.

B. Do not permit finished casework to be exposed to continued construction activity.

C. Protect finished casework from damage by water, heat and other causes until final acceptance.

D. Replace casework exhibiting warpage, surface discoloration, and damage at no additional cost to owner.

END OF SECTION

DIVISION 22 – PLUMBING

22 0500 - GENERAL PROVISIONS – PLUMBING
22 1000 - MATERIALS AND METHODS – PLUMBING
22 1500 - THERMAL AND ACOUSTICAL INSULATION FOR PLUMBING SYSTEMS
22 2000 - PLUMBING FIXTURES AND EQUIPMENT

END OF SECTION



04-24-2026

SECTION 22 0500

GENERAL PROVISIONS – PLUMBING

PART 1 – GENERAL

1.1 SCOPE:

A. Provisions of this Section apply to all Plumbing work.

B. Include the provisions of General Conditions as part of this Section.

C. Provide all labor, materials, equipment, and services necessary for the completion of all Plumbing work shown or specified, complete and ready for operation, consisting in general of the following:

1. A system of sanitary drain, waste, and vent piping.

2. A system of domestic water piping.

3. A system of compressed air piping.

4. Providing plumbing fixtures and equipment as shown on drawings.

D. Give required notices, file drawings, obtain and pay for permits, deposits and fees necessary for the installation of the Plumbing 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.

1.2 DRAWINGS:

A. Plumbing Drawings are diagrammatic and subject to requirements of Architectural Drawings and conditions existing in the field. Plumbing Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work.

B. Follow the drawings closely, coordinate dimensions with Architectural Drawings and field conditions. DO NOT scale Plumbing 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 mislocated work in proper manner.

D. Contractor for Plumbing work is responsible for coordinating with all trades.

1.3 APPLICABLE CODES AND STANDARDS:

A. Comply with the current editions of the following Codes and Standards:

1. ANSI/B31.9 - Code for Building Services Piping
2. ASME Boiler and Pressure Vessel Code
3. NFPA 54 - National Fuel Gas Code
4. NFPA 70 - National Electrical Code, 2023
5. NFPA 90A – Installation of Air Conditioning and Ventilating Systems
6. NFPA 101 - Safety to Life from Fire in Buildings and Structures
7. Other standards as referenced in other sections of Division 22
8. 2021 International Building Code
9. 2021 International Plumbing Code
10. 2021 International Fuel Gas Code
11. 2021 International Mechanical Code
12. 2021 International Energy Conservation Code

1.4 QUALIFICATIONS OF SUBCONTRACTOR:

A. The Plumbing Subcontractor shall meet the following minimum qualifications:

1. He shall have been in business as a Plumbing Contractor for at least 3 years prior to the date of opening bids.
2. He shall have a current Master Plumber's Certificate of competency issued by the State of **Alabama** and the City and County in which work occurs.
3. He shall have a satisfactory experience record with Plumbing installation of character and scope comparable with this project and shall have completed three such installations in the past three years.
4. If the Plumbing Subcontractor, with the Engineer’s approval, uses a Sub-Subcontractor to provide another discipline that the Subcontractor does not normally furnish, that Sub-Subcontractor shall meet the same qualifications as the Subcontractor.

1.5 CONFLICTS AND INTERFERENCES:

A. If systems interfere or conflict, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.6 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.

1.7 COOPERATION:

A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.8 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.

1.9 MATERIALS:

A. Unless otherwise noted, provide new, standard, first-grade materials throughout. **Unless otherwise noted, all pipe, fittings and valves shall be made in the United States of America.**

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 estimate, without substitution, and shall be furnished under the contract unless requests for equivalents are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.

C. Equivalents will be considered only if written request for approval has been received by the Architect (from a general contract bidder) 10 days prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which an equivalent is proposed and a complete description of the proposed equivalent including drawings, cuts, performance and test data, and deviation from the specification and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the equivalent may require shall be included. The burden of proof of the merit of the proposed equivalent is upon the proposer. The Architect's decision of approval or disapproval of a proposed equivalent is final.

D. If the Architect approves any proposed equivalent 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 proposed equivalent will be considered after the Contract has been executed, except as described in the General Conditions.

F. Within 45 days of execution of contract and before ordering materials or 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. Submit PDF format files for approval. Provide PDF files of approved data for project close-out.

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.

1.10 RECORD DRAWINGS:

A. When work starts the Architect will furnish two complete sets of white prints of the Plumbing 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 complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this contract.

1. Accurately show location, size and elevation of new exterior utility work and its relationship to any existing utilities, obstructions, etc., contiguous to the area of work.

2. Block out areas modified by change-order & identify them by change-order number.

3. 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.

C. When work is completed, the Engineers' CAD/electronic drawing files will be made available upon request for the convenience to the contractor and for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the CAD files, removing all superseded data in order to show the actual completed conditions.

1.11 PROTECTION OF EQUIPMENT:

A. During construction, protect Plumbing equipment from damage or deterioration.

B. When installation is complete, clean equipment and make ready for painting.

1.12 INSTALLATION OF EQUIPMENT:

A. Install equipment to provide normal service access to all components.

B. Where drawings show sufficient space for removing components, install equipment to provide such clearance. ***Provide space at all equipment power and control panels as required by local codes.***

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. 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.

1.13 EQUIPMENT SUPPORTS:

A. Provide supports for piping and equipment. Hot dip galvanize after fabrication all grillage, supports, etc., located outdoors. Prime coat and paint all grillage, supports, etc. located indoors. Where noted provide 304 stainless steel supports. At the Contractor's option, all grillage, supports, etc. located outdoors may be 304 stainless steel instead of hot dip galvanized.

B. Set floor-mounted equipment on concrete pads or platforms (as indicated) of height shown, but not less than 3-1/2" high. Chamfer pads 1". Extend pad 6" beyond equipment in all directions. Provide pads as follows:

1. Water heaters and air tank: 6" high, No. 4 rebar 12" o.c. both ways.

1.14 CUTTING AND PATCHING AND INCIDENTAL WORK:

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 Plumbing 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. Provide all motors incidental to the Plumbing systems. Wiring of motors, switches and starters is included in "Electrical Sections".

D. Furnish motor starters as specified below.

1.15 FLASHING:

A. General: Furnish all pitch cups, metal base flashing and counter flashing required for Plumbing Work. Installation of above items is specified in Roofing Section.

B. Pitch Cups: 20 gauge galvanized steel, at least 8" deep, bases mitered and soldered and extending at least 4" horizontally.

C. Metal Base Flashing: Galvanized steel for ferrous items, and stainless steel for stainless steel items. Minimum thickness 22 gauge (0.034") galvanized steel, 20 gauge (0.038") stainless steel, 0.032" aluminum. Bases mitered and soldered extending out at least 4" horizontally and 8" vertically.

D. Metal Counter Flashing: Of material and gauges specified for base flashing, lapping base flashing at least 3".

E. Vent Pipe and Roof Drain Flashing: Specified in "Roofing Section".

1.16 EXCAVATION & 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 (engineered fill) with sand or fine gravel (89/10) in accordance with requirements of "Sitework" no less than 95% compactancy. Backfill paved areas with sand or fine gravel (89/10) 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, matching adjacent work.

D. Resod grassed areas and replace bushes, etc.

1.17 MOTORS, STARTERS & 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 approval make changes in electrical equipment from that shown on the Electrical Drawings, the Contractor shall be responsible for the cost of required changes.

C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

1.18 SLEEVES:

A. For pipe through floors inside fire rated chases or through non-fire-rated walls: 20 gauge galvanized steel, 1" larger than pipe or pipe covering.

B. For pipe through concrete beams: schedule 40 black steel pipe, 1" larger than pipe or pipe covering.

C. For pipe passing through floors outside fire rated chases and fire rated wall and partitions, provide 20 gauge steel sleeve leaving the annular space between pipe or pipe covering as required by UL systems. Where pipe is insulated, insulation shall be continuous thru sleeve. Refer to Section Through-Penetrations Firestop Systems where included in the contract documents, Otherwise, seal between sleeve and pipe or pipe covering with 3M Brand Fire Barrier CP 25WB caulk, Flamestop V, Specified Technologies, Inc. "Spec Seal Sealant", Rectorseal Corp. Metacaulk 950 or Hilti FSONE bearing UL listing for actual conditions of installation, thickness and application in strict accord with UL reference for each type installation. Any equivalents must meet the 10 day prior approval provision and must show UL approval for all conditions, bare pipe, insulated pipe, etc. For plastic piping material submittal must show UL approval for each application and if caulk comes in direct contact with pipe, it must be compatible and not injurious to the pipe.

D. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place.

E. Extend floor sleeves 1-1/2" above finish floor in areas where floor is subject to being wet during normal usage (Plumbing rooms, toilets, etc.).

F. Where exposed pipes pass through walls and partitions in finished spaces, provide chrome plated F & C plates or escutcheons.

1.19 PAINTING:

A. Refinish equipment damaged during construction to new condition.

B. Paint all non-potable water pipe and insulation yellow in accordance with Plumbing Code using paint of type specified in Painting Section.

C. Prime and paint all bare, exposed, exterior piping using type specified in Painting Section. Gas piping shall be painted yellow unless otherwise noted.

D. Prime and paint all grillage, supports, etc. located indoors, except where noted to be galvanized.

E. Other painting is specified in Painting Section, Finishes Division.

1.20 PIPE IDENTIFICATION:

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.) Markers shall be equal to Craftmark, Brady, Seton or Brimar.

B. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.

C. 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. At manifolds.

6. On risers, just above and below floors.

7. All natural gas piping in the 2 psig system: label at the beginning, at all gas cocks, at ends and at 6'-0" intervals with labels reading "2 psig".

1.21 EQUIPMENT IDENTIFICATION:

A. Provide 2" x 3" or larger laminated plastic nameplates with 1/2" numbers and letters in colors specified below. Screw tags to equipment in obvious locations. Engrave equipment designation and numbers as shown on plans and drawings on upper half of tag, leaving lower half of tag for future engraving by Owner.

B. Provide similar nameplates for motor starters furnished under Division 26.

C. Secure nameplates with acorn head screws.

D. Colors:

1. Equipment connected to utility power only - black letters on white nameplates.

2. Equipment connected to emergency power - red letters on white nameplates.

1.22 ACCESS DOORS:

A. Furnish and install access doors for valves, fire dampers, dampers, controls, air vents, and other items located above non-liftout ceilings or behind partitions or walls. Doors in non-fire rated walls and ceilings: 16-gauge steel with hinges and screwdriver latches. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Doors in security ceilings to be 10 ga. steel panels, white powder coat, 2” x 2” x 3/16” steel angle frame heavy duty butt hinges with security screws. Provide door styles compatible with adjoining surfaces as selected by Architect. Size doors to permit removal of equipment and/or maintenance. Doors: Bar-Co, Nystrom, Williams Bros., or equal.

B. Mark lay-in ceilings with colored vinyl self adhering disc stuck on grid adjacent to maintenance access points.

1.23 TESTS, CLEANING & ADJUSTMENTS:

A. All tests shall be witnessed by the Architect in addition to authorities having jurisdiction. A minimum of 72 hour notice is required prior to performance of test.

B. After systems have been installed complete, adjust and test systems for proper operation and correct all noise or vibration conditions. Perform all tests as required by local codes. Contractor shall furnish testing equipment. ***All piping pressure tests shall be hydrostatic tests.***

C. If local codes are more stringent than the following, local codes shall govern.

D. Sanitary Systems:

1. 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.

2. Provide "Ball Test" on all piping 3" and larger with ball 1/2" smaller than pipe diameter.

E. Domestic water piping: Test by applying 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. Immediately and completely stop all leaks. On completion of roughing-in, cap all outlets, make connections with house supply line, and put under full water pressure. 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 sediment and scale and then disinfect. Disinfect piping with hypochlorite solution of chlorine or compressed chlorine gas applied through an approved chlorinator. Operate 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. 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 as required.

F. Natural Gas Piping Tests: 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; or in the absence of such requirements, apply in Architect's presence an air pressure test equal to 25 psig, which piping shall maintain without pressure drop for at least four hours. Stop all leaks shown up by such test and repeat test until piping is airtight. Black steel piping below grade shall be Holiday tested prior to backfilling.

G. Start-Up and Service:

1. The Contractor and factory authorized service representative for the air compressors, and water heaters shall place each item of such equipment into satisfactory operation with all automatic and safety devices. Further, all adjustment service required shall be performed during the warranty period.

2. In addition, submit equipment manufacturers' start-up reports for items listed above. See Paragraph "Project Close-Out", below.

3. The Contractor shall balance all hot water pumps and circuit setters to flow shown on drawings. Balancing shall not be started until 1) Systems have been completed, including leak testing and cleaning and until systems have been refilled, pumps are rotating correctly, and strainers have been cleaned and baskets used for the ultimate installation have been installed, and 2) Expansion tanks have been installed and correct system pressure is being maintained, and system has been vented and is free from air.

a. Adjust circuit setters to meet design GPM requirements. Measure and record GPM.

b. Produce a report documenting the measured flows and submit three (3) copies of the report to the Architect.

1.24 WARRANTY & 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 year after date of substantial completion of the Contract. Should any defects in material, workmanship, or equipment be made known to Contractor within the one-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 7 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.***

D. Provide PDF of manufacturer's operating and maintenance manuals and parts lists for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency thereof. Include all warranty dates on equipment and guarantees.

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.

1.25 PROJECT CLOSE-OUT:

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: PDF files and CAD files.

2. Equipment Submittal Data PDF files.

3. Equipment operating and maintenance manuals PDF files.

4. Maintenance schedule.

5. Equipment warranty dates and guarantees.

6. Circulating hot water balance report.

7. Certificate of disinfection of domestic water lines as required by local authority.

8. Submit factory start-up reports for:

   a. air compressors

   b. Water heaters

9. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

END OF SECTION

SECTION 22 1000

MATERIALS AND METHODS – PLUMBING

PART 1 - GENERAL

1.1 SCOPE:

A. Section 22 0500 - "General Provisions - Plumbing" shall apply to and become part of this Section.

PART 2 - MATERIALS: (Unless otherwise noted, all pipe, fittings and valves shall be manufactured in the United States of America)

NOTE: All materials used in systems that may be used for potable water shall meet the Reduction of Lead in Drinking Water Act.

2.1 SANITARY, WASTE AND VENT PIPING:

A. Inside building to foundation wall: Vent piping smaller than 3": Cast iron. Waste piping above floor 2" or smaller: Cast iron, or DWV copper. Other waste and vent piping above slab on grade: Cast iron. Piping below slab on grade: PVC-DWV plastic. Piping from discharge of equipment that will convey water at a temperature greater than 140°F shall be cast iron. Pipe exposed in mechanical rooms or housekeeping rooms shall be cast iron. Piping in return air plenums shall not be PVC.

B. Outside building (from foundation wall to sewer provided under the Civil Section) 2'-0" or more below grade in non-traffic areas: PVC-DWV, or cast iron. Less than 2'-0" cover and in traffic areas: Cast iron or Ductile iron.

C. Cast iron hub-and-spigot soil pipe: tar coated with cast iron fittings of corresponding weight. Service weight, ASTM Specification A 74.

D. Cast iron soil pipe: cast iron no-hub pipe and fittings, CISPI Standard 301, ASTM A888 shall be used only above slab on grade.

E. Ductile iron pipe: Class 52, ASTM A746, ANSI/AWWA C151/A21.51 cement lined, fittings of corresponding weight, but not cement lined.

F. Galvanized steel pipe: Schedule 40, ASTM A53, with 150 lb. cast iron screw pattern fittings, ASTM A-126.

G. DWV copper pipe: copper drainage tube DWV meeting ASTM B 306 with cast bronze solder joint drainage fittings, ANSI B-16-23.

H. PVC-DWV plastic pipe: PVC-DWV, ASTM D-2665 shall not be used in ceiling plenum return. Solid core only permitted. Cell core not allowed. Provide PVC to cast iron adaptors below slab on grade for caulking or compression joint. No hub bands are not allowed. As an alternative provide coupling equal to Mission Heavyweight at the finish floor.

I. Joints for cast iron piping: compression gasket especially made for cast iron soil pipe, ASTM FC-564-85.

J. Joints for no-hub cast iron piping: no-hub neoprene gasket and stainless steel coupling CISPI Standard 310 & ASTM C1277. Joints for 4" and larger shall be 4-band heavy-weight equal to Husky. No hub bands are not allowed below slab on grade.

K. Joints in galvanized pipe: screwed with Teflon tape applied to male threads.

L. Joints in ductile iron pipe: push on joints applied as directed by manufacturer meeting ANSI/AWWA C111/A21.11 requirements.

M. Joints for PVC-DWV plastic pipe: solvent welded cement, ASTM D-2564, made in accord with ASTM D-2855. Provide cast iron to PVC adaptors, for caulking or compression joint when connecting to a cast iron drain or when converting from cast iron to PVC.

N. Install vent stacks through roof. Terminate 6" above finish roof or according to local code. Flashing is specified under Roofing Section.

2.2 DOMESTIC WATER PIPING:

A. Domestic Water piping within building: copper tube. Water piping outside building smaller than 3": copper tube.

B. Copper tube, ASTM B-88, copper water tube, type "L" hard temper inside building, type "K" outside building. Fittings: wrought copper water tube fittings, ANSI B 16.18 or B 16.22. For pipe 4" and larger: Victaulic copper fittings may be substituted for soldered joints.

C. Joints on copper tube: soldered as recommended by manufacturer, using 95-5 solder. Lead free solder, flux, etc. is required. Mechanically formed tee fitting, as created by T-Drill, is an acceptable method of installation. All joints created in this manner shall be brazed in compliance with code and in accordance with manufacturer's recommendation. Soft solder joints are prohibited. Installation shall be performed by certified T-Drill crafts people.

D. Provide temporary construction water at site as required.

2.3 COMPRESSED AIR PIPING:

A. All compressed air pipe: Aluminum tube equal to Champion "Quick-Lock" aluminum air-specific tubing with nickel plated brass fittings. Non-metallic fittings are not acceptable. Approved equal.

B. Connect to air compressor or dryer where shown.

C. Hose Reels: 50 feet x 1/2", equal to Reelcraft. Mounted on wall or attached to structure. Coordinate hose end connection with Owner.

2.4 PLUMBING VALVES:

A. Supply water piping valves as specified. All valves shall meet the Reduction of Lead in Drinking Water Act.

1. Ball valves: (2" and smaller) all bronze, 600 psig WOG, 150 psig WSP, stainless ball and stem, full port, Teflon seats, stem packing seal and thrust washer. Nibco T585-66-LF or S-585-66-LF, Watts, Apollo, Milwaukee or Josam. Provide extension stem capable of clearing 2" insulation, with memory stop, when operated will not disturb vapor seal of insulation.

2. Butterfly Valves 2-1/2" and larger: Butterfly shall have a ductile iron body with EPDM seal and aluminum bronze disc. The butterfly valve shall meet MSS SP-67, type I standard. The butterfly valve shall have a CWP rating of 1380 kPa (200 psig). The valve design shall be lug type suitable for bidirectional dead-end service at rated pressure with downstream flange removed. The body material shall meet ASTM A 536, ductile iron. Nibco LD2000 or equal by Watts or Bray.

3. Check valves 2" and smaller: All bronze, 125 psig WSP, swing check, Nibco S-413-Y-LF, Milwaukee or Watts.

4. Water pressure reducing valves: For low flow Watts LFU5B; higher capacity Watts Series LF115, or Wilkins, Conbraco or Cash Acme, complete with inlet strainer, unions and inlet and outlet pressure gauges.

5. Calibrated balancing valves ("Circuit Setter"): 125 psig WP, 2" and smaller bronze, screwed; 2-1/2" and larger IBBM, flanged plug valves. All with indicator for angular position of valve, meter connections with positive shut-off valves and internal seals to prevent leakage around stem. Valves should have a locking device to prevent opening past preset position. For each valve provide a flow vs. differential pressure vs. angular position calibration chart and pre-formed foam insulation suitable for temperatures from 35 to 250F. Nibco 1810LF (small) or 737 (large), Armstrong, B&G, Taco or equal.

B. Natural gas valves: Plug cocks – 2-1/2" and larger, Resun R-1431, AGA seal of approval, 175 psi; 2" and smaller, Milwaukee BB2-100, Nibco FP-600, Conbraco GB-10/11, GB-50 series, or Resun R-1430 with CSA seal of approval, 175 psi.

C. Compressed Air Valves:

1. Ball valves (2" and smaller): Stainless steel, compatible with aluminum piping specified.

2. Air pressure reducing valve: Watts, Wilkens, Cash Acme, or approved equal, complete with strainer and unions. Sizes as shown on drawings, with outlet pressure gauge, reading 0-100 psi.

2.5 PIPE HANGERS:

A. General: Pipe hangers, Anvil, PHD, Michigan Hanger, B-Line or Elcen. Anvil figure numbers are given for reference. Provide copper clad or plastic coated hangers on bare copper lines.

B. Equip pipe hangers with vibration isolators as specified under Vibration Isolators.

C. Pipe hangers for lines 3" and smaller: adjustable wrought ring hangers, Anvil Fig. 97 or 69 or wrought clevis hangers.

D. Pipe hangers for piping 4" and larger: adjustable wrought clevis hangers.

E. 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.

F. Provide riser clamps on pipe risers on each floor. Clamps in contact with copper or plastic pipe, plastic coated.

G. Beam Clamps: Anvil Fig. 228.

H. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts. Anvil Fig. 282.

I. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (powder driven anchors are not acceptable).

J. 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", 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.

K. Support plumbing water, medical gas and vacuum piping within stud partitions with brackets as manufactured by P&M Bracket Company, Sumner Products, B-Line Ruff-in or Holdrite. Wire is expressly prohibited. Support horizontal plumbing soil and waste piping within stud partitions with Unistrut anchored to floor. Provide fire treated wood backing where required to anchor fixtures and brass securely.

L. Space pipe hangers at maximum: 5' intervals for cast iron pipe. Pipe hanger spacing for screwed, solder joint and welded piping: 1/2" and 3/4", 6 ft.; 1" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3” and over, 12 ft. Install additional hangers at change of direction and valve clusters.

M. Install pipe hangers on insulated pipe over pipe covering. Provide factory fabricated insulated pipe shields equal to Pipe Shields, Inc. "Thermal Hanger Shields" or Tru-Balance insulated saddles at hangers. Provide shield insulation of rigid calcium silicate indoors or rigid Perlite Silicate outdoors, the same thickness as adjacent pipe covering. (At Contractor's option, pipe shields may be field fabricated using rigid calcium silicate or foamglass insulation with ASJ and 20 gauge galvanized steel protector. Shield length: 1.5 times nominal pipe size but not less than 4".)

2.6 THERMOMETERS AND GAUGES:

A. Non-mercury in glass blue reading separable socket industrial thermometers with die cast aluminum or high impact plastic casings of appropriate pattern for each installation, 9” scale lengths and ranges shown, Palmer, Trerice or Weksler. Install thermometers in brass or stainless steel wells. Equip thermometers installed in insulated lines with 1” extension stems or stems long enough to permit unions to clear insulation whichever is greater.

B. Where shown install brass thermometer wells with screwed caps. Install wells at an angle to retain oil. Size well to fit thermometers specified.

C. Enlarge pipe 2" and smaller to 2-1/2" at thermometers and thermometer wells.

D. Install 4-1/2" dial pressure gauges where shown. Gauges shall have bronze or stainless steel bourdon tubes, 316 stainless steel movement, aluminum or polypropylene solid front cases, adjustable micrometer pointer and accuracy Grade 2A not less than 1/2% of full scale over the entire range, without mounting flange. Gauges shall be Ashcroft 1279, Marsh Series P01, Trerice 450-B, Weksler AA44-2 or U.S. Gauge 1980L with minimum bourdon tube diameter of 3". Provide ball valves for all pressure gauges. Provide siphons for steam gauges.

E. Where shown, provide temperature and pressure measurement plugs and caps equal to Peterson Equipment Co., Inc. "Pete's plug with Nordel seats and seals". Provide one Pressure and Temperature Kit consisting of a 0-100 psi pressure gauge with adaptors, and two thermometers (25-125°F and 0-220°F), all in carrying cases. Provide nipples for Pete’s plugs as required to extend through pipe insulation.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION:

A. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.

B. Slope Sanitary Drain Lines:

1. 3” and larger: minimum 1/8” per 1’.

2. Less than 3”: minimum 1/4” per 1’.

C. Provide welding material and labor in accordance with the welding procedures of the Heating, Piping, and Air Conditioning Contractors' National Association or other approved procedure conforming to the requirements of ANSI B31.9 "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 oxyacetylene welding. Provide full perimeter welds at both face end and collar end of each slip-on flange.

D. Install piping to allow for expansion. Make connections to plumbing fixtures and all equipment to eliminate undue strains in piping and equipment. Furnish necessary fittings and bends to avoid springing of pipes during assembly.

E. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.

F. Make horizontal water line size reductions using eccentric reducers (tops flat).

G. Install 3/4" ball valve drains with hose adaptors at low points of water piping and at bases of all risers (where shown provide larger drains). Provide screwed caps with chains on hose adaptors.

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. Provide unions on all sides of control valves.

I. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulating unions or couplings, equal to Victaulic style 47, "V-line" insulating couplings as manufactured by Lochinvar, thread to thread or CTS fabrication flange adaptors for flange connections.

J. Near heating and air conditioning equipment requiring water provide valved and capped water outlets of sizes shown for connection to equipment, including reduced pressure principal backflow preventers. Make final connections under HVAC work. ***Note that all piping and insulation downstream from backflow preventer must be painted yellow.***

K. Run piping concealed, except where specifically shown or specified to be exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise.

L. Lay underground pressure piping so top of pipe is at least 18" below finished grade. Support all underground piping solidly along body of pipe. Strongly suspend other piping from building construction.

M. Pipe shall be braced at flexible connections to prevent blowouts under operating conditions.

N. Lay out and grade all gas piping so as to have a minimum of trapped lines. Where trapping of pipe is unavoidable, provide 4" to 6" scale pocket at low point, with removable cap fitting accessible for cleaning out pocket. Install 175 psig WP bronze cock and union at all connections to gas-fired equipment.

O. Install no gas piping beneath interior slabs on grade. Where gas piping must be installed below slab on grade, pipe must be encased in steel pipe sealed and vented to exterior as shown on detail.

P. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two wrappings of polyvinyl chloride tape or equivalent protection approved by Architect.

Q. Provide water hammer arrestors equal to Wilkins WH2950XL. Refer to drawings for location and P.D.I. size. Shock arrestors are required on all equipment with solenoid shutoff valves such as washing machines and dishwashers whether shown or not. Select WH2950XL for use with fixtures which may supply drinking water. Equal by Josam, J.R. Smith, Wade, or Sioux Chief is acceptable.

R. All water piping shall be installed within the heated envelope of the building, or otherwise protected from freezing.

3.2 INSTALLATION OF VALVES:

A. Provide shut-off valves in supply and return connections to each item of equipment. Locate valves to isolate each item to facilitate maintenance and/or removal.

B. Provide check valve in discharge line adjacent to each pump.

C. Locate valves in piping connections to heat exchangers, 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 the equipment.

D. Provide sweat to screw adaptors where required.

E. Install with valve stems upright or horizontal.

END OF SECTION

SECTION 22 1500

THERMAL AND ACOUSTICAL INSULATION FOR PLUMBING SYSTEMS

PART 1 - GENERAL

1.0 GENERAL:

A. All insulation shall be installed by an insulation contractor in business a minimum of 3 years as an insulation contractor and has completed projects similar in scope to this project.

1.1 SCOPE:

A. Section 22 0500 - “General Provisions – Plumbing” shall apply to and become part of this Section.

B. Repair existing insulation at points of connection and/or alterations to existing work.

C. “Exposed” is defined as: Exposed to view when construction is complete. (Items which are not “exposed” are considered “concealed”.)

D. The use of any material containing asbestos is strictly prohibited.

E. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

1.2 INSULATION:

A. Comply with NFPA 90A.

B. Pipe hanger shields are specified in Section 22 1000 - “Materials and Methods - Plumbing.”

C. Use insulation and adhesives with Underwriter's Laboratories and ASTM E-84 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 casings.

2. 150 for all other pipe and equipment insulation.

PART 2 - MATERIALS

2.1 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). For domestic hot water circulating system, thermal conductivity shall be 0.27 BTU/(h)(sq.ft.)(°F/in.) at 75°F mean temperature.

B. For all lines seal jacket with self sealing lap. 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 and flanged unions. Do not cover screwed unions on hot lines. Finish concealed fittings with a skim-coat of mastic and when mastic is dry, fitting shall be covered with glass fab and vinyl acrylic mastic unless otherwise noted below. Zeston type fitting covers may be substituted for glass fab and final coat of mastic on concealed fittings provided fire and smoke ratings are met. Finish fittings exposed in equipment rooms, boiler room, and in finished spaces with vinyl acrylic mastic over glass fab over mastic.

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 over skim coat of mastic shall be applied around main, lapping contoured joint at branch by 2" minimum for the full 360° 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.

PART 3 - INSTALLATION

3.1 PLUMBING PIPING:

A. Bodies of floor drains and floor sinks serving refrigeration equipment, AC units and ice machines and traps and waste piping between such drains and waste stack: “Foamed plastic pipe covering”, 1" thick.

B. Domestic water piping exterior, above grade: “Cellular glass pipe covering, rigid,” 1” thick. Include aluminum jacket and electric pipe line heaters.

C. Cold water piping, interior, above grade: “Fiberglass pipe covering”, 1" thick. Pipe insulation in partitions and chases may be 1/2" thick when needed for tight spaces.

D. Hot water piping, interior, above grade: “Fiberglass pipe covering”, 1” thick insulation for up to 1-1/4” pipe, and 1-1/2” thick insulation for 1-1/2” and larger pipe.

END OF SECTION

SECTION 22 2000

PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE:

A. Section 22 0500 - "General Provisions - Plumbing" and Section 22 1000 - "Materials and Methods - Plumbing" shall apply to and become part of this Section.

PART 2 - PRODUCTS

2.1 DRAINS:

A. See Piping Specialties Connection Schedule – Non-Pressure schedule on Sheet P0.01.

2.2 WALL HYDRANT:

A. See Plumbing Specialties Connection Schedule – Pressure schedule on Sheet P0.01.

2.3 CLEANOUTS:

A. Furnish and install cleanouts where indicated on drawings and at all 90-degree bends, angles, upper terminals and not over 50' apart on straight runs. All cleanouts on cast iron piping to have bronze countersunk rectangular tapered slotted plugs. PVC or acid waste piping cleanouts 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, 8" and less.

B. Exposed Cleanouts: Cast brass plug type, J.R. Smith 4470T.

C. Wall type cleanout plug and access covers, J.R. Smith 4472T. Cleanout plug must be within 1" of finish wall and must be tapped for access cover. On PVC plastic and acid waste pipe in wall: Cleanout access cover J.R. Smith 4710.

D. Floor type cleanout access covers in unfinished areas: J.R. Smith 4239L/LXH-NB. Finished areas: J.R. Smith 4111L/LXH-NB. Plug must be within 3" of finished floor. Provide 4193L/LXH-NB covers where installed in terrazzo floors. Grout cleanout below access cover to seal watertight. Provide option 14 cleanout carpet markers where installed in carpeted floors.

E. Floor type cleanouts for acid waste piping: Orion FCO-NB.

F. **Coordinate the exact location of all cleanouts with the Architect.**

2.4 PLUMBING FIXTURES:

A. Unless otherwise specified, all fixtures complete as catalogued, white color, exposed metal trim chromium plated. Fixtures shall be without discoloration, chips or flaws and shall be free from cracks. Warped or otherwise imperfect fixtures will not be acceptable.

B. Clean all fixtures to a clean and sanitary condition.

C. Fixtures and brass shall be securely anchored. Carriers shall be securely anchored to floor with lag bolts, as recommended by the manufacturer. Single water closet carriers shall include J.R. Smith M-51 rear anchor foot support. Do not conceal until Architect has observed anchors.

D. Flush valve supports equal to Sloan "YJ" shall be installed 1" below vacuum breaker, on all flush valves. Flush valves on A.D.A. water closets must be set so that handle is to the wide side of the stall and handle is no more than 44" above finish floor. Urinal flush valves on A.D.A. urinals shall be no more than 44" above finish floor.

E. Seal wall hung fixtures at wall with white caulk. Seal countertop fixtures with clear silicone sealant. Seal floor mounted fixtures at floor with grout.

F. All fixtures noted to be A.D.A. approved must be set with great care to assure proper mounting height and proper distance from wall. Elevation of flush valves shall be coordinated with grab bars (see Architect). All shower control valves for ADA showers shall be set with centerline 44" above finish floor. Trip levers for tank type water closets shall be installed to the wide side of the stall.

G. All supplies, stops, faucets, etc. on fixtures that could be used for drinking water shall meet the Reduction of Lead in Drinking Water Act.

H. Contractor shall coordinate all sinks and faucets with casework/millwork shop drawings prior to purchase of sink/faucet. In particular, coordinate A.D.A. vs. non-A.D.A. fixtures with casework/millwork. Failure to do so will make contractor liable for incorrect fixtures.

I. See Plumbing Fixture Connection and Description Schedule on Sheet P0.01.

2.5 PLUMBING EQUIPMENT:

A. See plumbing equipment schedules on Sheet P0.01.

2.6 EQUIVALENT MANUFACTURERS:

A. Where Zurn fixtures are listed above, Kohler, American Standard, or Toto may be utilized.

B. Where Zurn flush valves are listed above, Sloan or Delaney may be utilized.

C. Where Smith is listed above, Josam, Watts, Zurn or Wade may be utilized.

D. Where Elkay water coolers are mentioned above, Halsey Taylor, Sunroc, or Oasis may be utilized.

E. Where B&G is listed above, the equal of Armstrong, Taco, or Thrush may be utilized.

F. Where Elkay sinks are listed above, Just may be utilized.

G. Where Zurn water closet seats are listed above, Church, Beneke, Bemis, Centoco or Olsonite may be utilized.

H. Where Lawler combination pressure balanced and thermostatic mixing valves are listed above, Powers, Symmons, or Leonard may be utilized.

I. Where Weil is listed above, Chicago Pump Co., Enpo or Federal may be utilized.

J. Where T&S Brass is listed above, Chicago Brass, Cambridge or Zurn may be utilized.

K. Where T&S Brass is listed above, Chicago Brass, American Standard, Kohler, Zurn, Cambridge, Delta HDF or Speakman may be utilized provided that manufacturer can furnish all fixture brass specified.

L. Where Delta is listed above, Moen, Symmons or Elkay may be utilized.

M. Where A.O. Smith water heaters are listed above, Lochinvar, State or Bradford White may be utilized.

N. Where Stern Williams is listed above, Fiat, or Zurn may be utilized.

O. Where Zurn is listed above, the equal of McGuire, Watts, Dearborn or Brasscraft may be utilized.

P. Where Navien is listed, Bosch may be utilized.

Q. Where Eemax is listed, Chronomite or Stiebel may be utilized.

R. Where Guardian is listed, Haws or Acorn may be utilized.

S. Where Symmons is listed above, Zurn or Powers may be used.

PART 3 - EXECUTION:

3.1 MANUFACTURER'S INSTRUCTIONS:

A. Install all plumbing equipment and fixtures as recommended by the manufacturer's recommendations.

END OF SECTION

DIVISION 23 – HVAC

23 0500 - GENERAL PROVISIONS – HVAC
23 1000 - MATERIALS AND METHODS – HVAC
23 1500 - THERMAL AND ACOUSTICAL INSULATION FOR HVAC SYSTEMS
23 5000 - HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES
23 6000 - AIR DISTRIBUTION
23 7000 - HVAC TESTING AND BALANCING
23 8000 - CONVENTIONAL AUTOMATIC CONTROLS
23 8100 – DIRECT DIGITAL CONTROL (DDC)

END OF SECTION



04-24-2026

SECTION 23 0500

GENERAL PROVISIONS – HVAC

PART 1 - GENERAL

1.1 SCOPE:

A. Provisions of this Section apply to all Heating, Ventilating, and Air Conditioning (HVAC), Controls, HVAC Commissioning, and Test and Balance work.

B. Include the provisions of General Conditions as part of this Section.

C. Provide all labor, materials, equipment, and services necessary for the completion of all HVAC work shown or specified, complete and ready for operation, consisting in general of the following:

1. Air-cooled chilled water system.

2. Condensing boiler hot water system.

3. Central station air handler.

4. Medium pressure supply duct to VAV terminal units.

5. VAV terminal units and low pressure air distribution.

6. Toilet exhaust system.

7. Direct digital control system expansion to existing Trane Summit Campus BAS.

D. 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.

E. Permitting is required for boiler blowdown, and non-contact cooling water discharged to surface waters.

The State Contact:
Alabama Department of Environmental Management
Attn: Water Division
Post Office Box 301463
Montgomery, Alabama 36130-1463
Telephone Number: (334) 271-7823
Fax Number: (334) 279-3051
E-Mail: H2omail@adem.state.al.us

F. Permitting is required for all boiler installations in Alabama. The Alabama Boiler and Pressure Vessel Safety Act, incorporating the current edition of ASME CSD-1 (Control and Safety Devices), requires all boilers installed in the State of Alabama to be permitted through the State of Alabama Boiler Inspector's office. The contractor shall permit the boiler installation as required by this Act and pay all fees associated with the permitting process.

G. "Provide" means to furnish and install, complete and ready for operation.

1.2 DRAWINGS:

A. HVAC Drawings are diagrammatic and subject to requirements of Architectural Drawings and conditions existing in the field. HVAC Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work.

B. Follow the drawings closely, coordinate dimensions with Architectural Drawings and field conditions. DO NOT scale HVAC 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 miss-located work in proper manner.

D. DO NOT scale drawings to locate ceiling diffusers. COORDINATE with lighting and ceiling grids. Contractor for HVAC work is responsible for coordinating with all trades.

E. Drawings and specifications are complementary. Work shown or specified in one is binding as if shown or specified in both. Any discrepancies between the drawings and specifications shall be brought to the attention of the Consultant for clarification during the bidding period. No allowance shall be subsequently made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the Consultant during the bidding period or by reason of any error on the Contractor’s part.

F. No attempt has been made to establish the required sections or splits of equipment relative to the size of access into the space, building, etc. Contractor shall establish all said splits, sections, etc. necessary to install equipment complete without undue disassembly of equipment or demolition of building parts at site of work.

1.3 APPLICABLE CODES AND STANDARDS:

A. Comply with the current editions of the following Codes and Standards:

1. ANSI/B31.9 - Code for Building Services Piping
2. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration
3. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality
4. ASHRAE 90.1 – Energy Compliance
5. ASME Boiler and Pressure Vessel Code
6. NFPA 30 - Flammable and Combustible Liquids Code
7. NFPA 54 - National Fuel Gas Code
8. NFPA 70 - National Electrical Code
9. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
10. NFPA 101 - Safety to Life from Fire in Buildings and Structures

11. Other standards as referenced in other sections of Division 23

12. 2021 International Building Code

13. 2021 International Plumbing Code

14. 2021 International Fuel Gas Code

15. 2021 International Mechanical Code

16. 2021 International Energy Conservation Code

17. The Alabama Boiler and Pressure Vessel Safety Act.

1.4 QUALIFICATIONS OF SUBCONTRACTOR:

A. The HVAC Subcontractor shall meet the following qualifications:

1. He shall have been in business as a HVAC contractor for at least **5 years** prior to the date of opening bids, and shall have held a license from the **Alabama** State Licensing Board for General Contractors for at least **5 years**.

2. He shall have a satisfactory experience record with HVAC installations of character and scope comparable with this project, and for at least **5 years** prior to the date of opening bids shall have had an established service department capable of providing service inspection or full maintenance contracts.

3. If the HVAC subcontractor, with the Engineer's approval, uses a sub-subcontractor to provide another discipline that the subcontractor does not normally furnish, that sub-subcontractor shall meet the same qualifications as the subcontractor.

1.5 CONFLICTS AND INTERFERENCES:

A. If systems interfere or conflict, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.6 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.

1.7 COOPERATION:

A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.8 VISITING SITE:

A. Visit site and become familiar with location and various conditions affecting work prior to bid. No additional allowance will be granted because of lack of knowledge of such conditions. No consideration shall be given to future claims due to existing conditions. Any discrepancies or interferences shall be reported immediately to the Architect/Consultant.

1.9 MATERIALS:

A. Unless otherwise noted, provide new, standard, first grade materials throughout. **Unless otherwise noted, all pipe, fittings and valves shall be made in the United States of America.**

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 estimate, without substitution, and shall be furnished under the contract unless requests for equivalents are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.

C. Equivalents will be considered only if written request for approval has been received by the Architect (from a general contract bidder) 10 days prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which an equivalent is proposed and a complete description of the proposed equivalent including drawings, cuts, performance and test data, and deviation from the specification and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the equivalent may require shall be included. The burden of proof of the merit of the proposed equivalent is upon the proposer. The Architect's decision of approval or disapproval of a proposed equivalent is final.

D. If the Architect approves any proposed equivalent 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 proposed equivalent will be considered after the Contract has been executed, except as described in the General Conditions.

F. Within 45 days of execution of contract and before ordering materials or 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. Submit PDF format files for approval. Provide PDF files of approved data for project close-out.

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.

1.10 SHOP DRAWINGS:

Before starting work, submit and obtain approval of detailed drawings, fully dimensioned (including elevations of ductwork and piping) and drawn to 1/4" to 1'-0" scale.

Submit a minimum of 2 sets of bond shop drawings or PDF format digital files of shop drawings. Piping shop drawings shall include drain and vent locations, pipe slopes down to drains and up to vents, piping elevations, piping connection details, and a list of piping materials. Ductwork shop drawings shall include elevations, construction methods, re-inforcements, gauges, and access door locations and sizes. Provide section drawings of locations where ducts cross or demonstrate with elevations that ducts will fit. All shop drawings shall be produced using AutoCad and a copy of the shop drawing files shall be provided in PDF format for shop drawing review. A thumb-drive with a copy of all approved shop drawings in CAD and PDF format shall be provided for project closeout. Shop drawings shall be received within 60 days of the execution of the contract and before consideration of a request for payment.

1. Ductwork (do not scale for diffuser locations, but coordinate with ceiling grids and lighting layout). See Section "Air Distribution". Shop drawings shall include material type (stainless steel, galvanized), finish (paint grip, etc.), actual sizes increased to allow for internal insulation and gauges along with fabrication section notes for individual sections. In addition, include elevations of bottom of duct above finished floor level. Show building sections through congested areas for coordination with structure and other disciplines. Provide joint details, duct seal methods, insulation type, etc.

2. Submit details of all apparatus casings and plenums.

3. Apparatus casings.

4. Complete mechanical equipment and fan room plans showing location of equipment, conduit stubs for motors, floor drains, and equipment pads and foundations.

5. Equipment piping.

B. Submit complete control and power wiring diagrams for approval before installing controls. See Controls Section.

C. Engineers' CAD/electronic drawings files will be available upon request for the convenience of the contractor and for use in preparation of shop drawings. A service fee of $100.00 per drawing sheet file shall be remitted to the Engineer prior to delivery of CAD/electronic drawing files along with a signed agreement between the Engineer and Contractor.

1.11 COORDINATION SHOP DRAWINGS:

A. Coordination shop drawings (2 sets of bond and PDF digital format files) will be required of the following areas, drawn to a scale not smaller than 1/4" = 1'-0":

1. Mechanical Room.

B. Start drawings as HVAC shop drawings indicating all ductwork piping, equipment and locations of mechanical room floor drains, and electrical connections to motors. Indicate elevations of all ductwork and piping. Draw sections as required to clarify congested situations. **Indicate elevations of all ductwork and piping. Include walls, ceilings, structure, and lighting.**

C. Engineers' CAD/electronic drawings files will be available upon request for the convenience of the contractor and for use in preparation of shop drawings. A service fee of $100.00 per drawing sheet file shall be remitted to the Engineer prior to delivery of CAD/electronic drawing files along with a signed agreement between the Engineer and Contractor.

D. Next, the Plumbing Contractor shall add all piping and plumbing to the drawings.

E. Next, the Fire Protection Contractor shall add all sprinkler heads and fire protection piping.

F. Next, the Electrical Contractor shall add all electrical fixtures, conduit and equipment.

G. Next, the drawings shall be submitted to the General Contractor for final coordination.

H. Finally, after the General Contractor has approved the drawings they shall be submitted to the Architect for his review and comments.

1.12 RECORD DRAWINGS:

A. When work starts the Architect will furnish two complete sets of 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. When work starts the Architect will furnish two complete sets of white prints of the approved shop drawings for the heating, ventilating, air conditioning. All corrections, variations, and deviations, including those required by change orders, if any, shall be recorded in colored ink or colored pencil at the end of each working day on these drawings. The contactor shall include the contract drawings schedules, details, sections, etc. marked as noted above to indicate changes. 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 complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this contract. Prior to examining any request for payment, the Architect shall review and approve the marked white prints at the site. HVAC white prints shall be approved shop drawings.

1. Accurately show location, size and elevation of new exterior utility work and its relationship to any existing utilities, obstructions, etc., contiguous to the area of work.

2. Block out areas modified by change order & identify them by change order number.

3. 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.

C. When work is completed, the Engineers' CAD/electronic drawing files will be made available upon request for the convenience to the contractor for a service fee of $100.00 per CAD/electronic drawing sheet file and for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the CAD files, removing all superseded data in order to show the actual completed conditions**.** Include with the record drawings equipment schedules, details, sections, and controls edited to show actual completed conditions. When record drawings are complete, provide one set of mylar reproducibles, 2 sets of bond prints, and one complete set of AutoCAD drawing files (AutoCAD 2016 format) and one set of PDF drawing files on CD-ROM disks.

D. Ductwork and Control Drawings (may be CAD files or a set of PDF shop drawings)**,** up dated to show actual conditions at completion of work. Include the contract drawings equipment schedules and details edited to show actual completed conditions.

E. HVAC piping drawings may be prepared as noted above, or HVAC piping may be added to the ductwork shop drawings noted above.

1.13 PROTECTION OF ROTATING PARTS:

A. For this paragraph only, "exposed" shall mean located in a casing or room or plenum with door large enough to admit a man.

B. Equip exposed belt drives with belt guards with holes for measuring speeds of driven shafts.

C. Provide exposed couplings with coupling guards.

D. Equip propeller fan wheels with wheel guards.

E. Equip inlets and outlets of exposed centrifugal fans with 1 1/2" #10 Diamond mesh galvanized steel screens.

F. Equip all exposed plug fans with wheel screens.

1.14 PROTECTION OF EQUIPMENT:

A. During construction, protect HVAC equipment and ductwork from damage or deterioration and prevent water, dust, etc. from entering the equipment or ductwork. Cover ends of ductwork before delivery to site with Duro-Dyne Dyn-O-Wrap. Cover all openings in equipment with Dyn-O-Wrap until ductwork is attached.

B. During construction, keep all stored ductwork securely covered for protection from water and dust. Do not store directly on the floor. Immediately remove all ductwork that is wet or dirty from the job site.

C. During construction, seal joints and seams in ductwork as it is installed.

D. When installation is complete, clean equipment and make ready for painting.

1.15 INSTALLATION OF EQUIPMENT:

A. Install equipment to provide normal service access to all components.

B. Where drawings show sufficient space for removing components, install equipment to provide such clearance. Provide space at all equipment power and control panels as required by local codes.

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 or pads and equipment shall be bolted to the isolators.

4. Air devices connected by flexible duct shall be secured independently of all other building systems to prevent falling if grid shifts.

1.16 EQUIPMENT SUPPORTS:

A. Provide supports for ductwork, piping and equipment. Hot dip galvanize after fabrication all grillage, supports, etc., located outdoors. Prime coat and paint all grillage, supports, etc. located indoors. Where noted provide 304 stainless steel supports. At the Contractor's option, all grillage, supports, etc. located outdoors may be 304 stainless steel instead of hot dip galvanized.

B. Set floor mounted equipment on concrete pads or platforms (as indicated) of height shown, but not less than 3 1/2" high. Chamfer pads 1". Provide pads and rails as shown on drawings.

C. Provide factory fabricated equipment roof supports with tops 16" above roof line for roof mounted items. Curbs shall match roof slope as required so units are installed level. Supports shall have integral cants, pressure treated wood nailers, and counter flashing. Supports shall be galvanized steel, gauge as required for loads, 18 gauge minimum.

1.17 CUTTING AND PATCHING AND INCIDENTAL WORK:

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.

C. Provide all motors incidental to the HVAC systems. Wiring of motors, switches and starters is included in "Electrical Sections".

D. Do all control wiring required for HVAC work and all power wiring required by Control Panels, Control System, and Control Devices.

E. Furnish motor starters as specified below.

F. Final water connections to services are included in this Section.

G. Permanent drain connections from AC units, etc., and auto air vents to nearest floor drain are included in this Section.

H. Door louvers are not included in this Section.

1.18 FLASHING:

A. General: Furnish all fan curbs, pitch cups, metal base flashing and counter flashing required for HVAC Work. Installation of above items is specified in Roofing Section.

B. Fan curbs for power roof ventilators are specified with the fans.

C. Pitch Cups: 20 gauge galvanized steel, at least 8" deep, bases mitered and soldered and extending at least 4" horizontally.

D. Metal Base Flashing: Galvanized steel for ferrous items, and stainless steel for stainless steel duct items. Minimum thickness 22 gauge (0.034") galvanized steel, 20 gauge (0.038") stainless steel, 0.032" aluminum. Bases mitered and soldered extending out at least 4" horizontally and 8" vertically.

E. Metal Counter Flashing: Of material and gauges specified for base flashing, lapping base flashing at least 3".

1.19 EXCAVATION & 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 ensure 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 (engineered fill) with sand or fine gravel (89/10) in accordance with requirements of "Sitework" no less than 95% compactancy. Backfill paved areas with sand or fine gravel (89/10) 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, matching adjacent work.

D. Resod grassed areas and replace bushes, etc.

1.20 REMOVAL OF EXISTING WORK:

A. Dismantle the following items and remove them from the premises. Upon removal they shall become the Contractor's property:

1. All mechanical equipment, ductwork, piping, etc.

1.21 MOTORS, STARTERS & 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 approval make changes in electrical equipment from that shown on the Electrical Drawings, the Contractor shall be responsible for the cost of required changes.

C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

D. Motors: 1750 RPM open drip proof construction unless otherwise shown or specified. Integral horsepower motors shall meet NEMA premium efficiency levels as stated in the latest version of NEMA MG-1. Allis Chalmers, General Electric, Goulds, Louis Allis, Westinghouse.

E. Where motors are shown or scheduled to be connected to a variable frequency drive, this motor shall be an inverter duty rated by the motor manufacturer and shall comply with NEMA MG1, Article 31.

F. Where shown on Electrical Drawings, furnish increment wound motors for 2 step starting.

G. Do not run motors until correct overload elements are installed in starters. Trading overload elements for elements of correct size for motors actually furnished shall be included in this Section.

H. Furnishing all starters is included in this Section. Starter installation is specified under "Electrical Section". Starters shall be equipped with melting alloy thermal overload and phase loss protection, in all 3 phases.

I. Unless otherwise shown or specified for single phase motors provide manual starters equal to Square D Class 2510. When installed in equipment rooms provide surface mounted enclosure, and when installed in finished walls outside equipment rooms provide flush mounted enclosure, key operated.

J. Provide H O A switches, fused control circuit transformers, auxiliary contacts, etc., as shown on control diagrams or required by control sequences (and/or arrange for these items to be furnished with the starters specified in Division 26, Electrical Work.)

K. All starters shall be the product of the same manufacturer.

L. All control panels, electrical assemblies, etc. must bear a label from a recognized testing laboratory as an assembly, not as individual components.

1.22 SLEEVES:

A. For pipe through floors inside fire rated chases or through non fire rated walls: 20 gauge galvanized steel, 1" larger than pipe or pipe covering.

B. For pipe through concrete beams: schedule 40 black steel pipe, 1" larger than pipe or pipe covering.

C. For pipe passing through floors outside fire rated chases and fire rated walls and partitions, provide 20 gauge steel sleeve leaving the annular space between pipe or pipe covering as required by UL systems. Where pipe is insulated, insulation shall be continuous thru sleeve. Refer to Through-Penetration Firestop Systems where included in the contract documents. Otherwise, seal between sleeve and pipe or pipe covering with 3M Brand Fire Barrier CP 25WB caulk, Flamestop V, Specified Technologies, Inc. "Spec Seal Sealant", Rectorseal Corp. Metacaulk 950 or Hilti FSONE bearing UL listing for actual conditions of installation, thickness and application in strict accord with UL reference for each type installation. Any equivalents must meet the 10 day prior approval provision and must show UL approval for all conditions, bare pipe, insulated pipe, etc. For plastic piping material submittal must show UL approval for each application and if caulk comes in direct contact with pipe, it must be compatible and not injurious to the pipe.

D. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place.

E. Sleeves for ducts: see fire dampers (Section: Air Distribution).

F. Extend floor sleeves 1 1/2" above finish floor in areas where floor is subject to being wet during normal usage (mechanical rooms, toilets, etc.).

G. Where exposed ducts pass through walls and partitions, provide 4" wide 20 gauge galvanized steel closure plates except at grilles and registers. Fit closure plates snugly to duct and secure to wall. Grout around ducts and sound absorbers at equipment room walls.

H. Where exposed pipes pass through walls and partitions in finished spaces, provide chrome plated F & C plates or escutcheons.

1.23 PAINTING:

A. Refinish equipment damaged during construction to new condition.

B. Paint all non potable water pipe and insulation yellow in accordance with Plumbing Code using paint of type specified in Painting Section.

C. Paint un insulated duct surfaces visible through grilles and registers flat black. If insulation is visible through grilles and registers is not black, it shall be painted flat black.

D. Prime and paint all bare, exposed, exterior piping using type specified in Painting Section.

E. Prime and paint all grillage, supports, etc. located indoors except where noted to be galvanized.

F. Other painting is specified in Painting Section, Finishes Division.

1.24 PIPE IDENTIFICATION:

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.) Markers shall be equal to Craftmark, Brady, Seton or Brimar.

B. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.

C. 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. At manifolds.

6. On risers, just above and below floors.

D. The refrigerant piping identification shall indicate the refrigerant designation and safety group classification of refrigerant used in the piping system. For Group A2L and B2L refrigerants, the identification shall also include the following statement “WARNING-Risk of Fire. Flammable Refrigerant.” For Group A2, A3, B2 and B3 refrigerants, the identification shall also include the following statement: “DANGER-Risk of Fire or Explosion. Flammable Refrigerant.” For any Group B refrigerant, the identification shall also include the following statement: “DANGER-Toxic Refrigerant.”

1.25 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 tag colors:

1. HVAC: White tags with black numbers.

C. Valve tag locations: At all valves on mains, risers and branches (not equipment service valves).

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 buildings extend existing sequences.

1.26 VALVE CHARTS:

A. In all mechanical rooms, provide charts showing number and locations of all labeled valves, type of service, etc. Laminate in heavy plastic and provide brass grommets for attaching to wall. Attach to wall with anchors and brass screws.

B. In existing buildings include existing valves in the charts of new valves.

1.27 EQUIPMENT IDENTIFICATION:

A. Provide 2" x 3" or larger laminated plastic nameplates with 1/2" numbers and letters in colors specified below. Screw tags to equipment in obvious locations. Engrave equipment designation and numbers as shown on plans and drawings on upper half of tag, leaving lower half of tag for future engraving by Owner.

B. Provide similar nameplates for motor starters furnished under Division 23.

C. Secure nameplates with acorn head screws.

D. Colors:

1. Equipment connected to utility power only black letters on white nameplates.

2. Equipment connected to emergency power red letters on white nameplates.

1.28 EXHAUST FAN IDENTIFICATION:

A. 2" X 3" or larger laminated plastic nameplates with red letters and numbers on white background, identifying type of fan, number according to plans, and rooms served. Engrave on upper half of tag, leaving lower half for engraving by Owner. Fasten with acorn head screws.

1.29 ACCESS DOORS:

A. Furnish and install access doors for valves, fire dampers, dampers, controls, air vents, and other items located above non liftout ceilings or behind partitions or walls. Doors in non fire rated walls and ceilings: 16 gauge steel with hinges and screwdriver latches. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Doors in security ceilings to be 10 ga. steel panels, white powder coat, 2” x 2” x 3/16” steel angle frame heavy duty butt hinges with security screws. Provide door styles compatible with adjoining surfaces as selected by Architect. Size doors to permit removal of equipment and/or maintenance. Doors: Bar Co, Nystrom, Williams Bros., or equal.

B. Mark lay in ceilings with colored vinyl self adhering disc stuck on grid adjacent to maintenance access points.

1.30 TESTS, CLEANING & ADJUSTMENTS:

A. General:

1. All tests shall be witnessed by the Architect in addition to the authorities having jurisdiction. A minimum of 72 hours notice is required prior to performance of tests.

2. All air duct pressure tests are specified in Section Air Distribution.

3. All HVAC air and water balance work and HVAC equipment tests (other than hydrostatic tests) are specified in section 23 7000, "HVAC Testing & Balancing". Notify the Testing and Balancing Agency when systems are ready for balancing - see Section 23 7000, "HVAC Testing & Balancing".

4. Testing and Balancing other than that noted above is specified in Section "HVAC Testing & Balancing".

5. All instruments used for testing and balancing work shall have been calibrated within 6 months and checked for accuracy prior to start of work.

6. Cooperate in the execution of work specified in Section 237000 HVAC Testing and Balancing and provide assistance as noted in Section 23 7000.

7. Perform all tests as required by local codes. Contractor shall furnish testing equipment.

8. If local codes are more stringent than the following, local codes shall govern.

B. Chilled Water and Hot Water Systems:

1. Before pipe covering has been installed, test all new work and make tight at two times operating pressure but not less than 45 psig. (Provide temporary crossovers and temporary pumps as required for cleaning new work before valves at connections to existing work are opened.) **Before filling pipe with water for testing, contact the Owner's Chemical Treatment Contractor and include corrosion protection in test water as recommended by the Chemical Treatment Contractor.**

2. Correct or replace defective workmanship or materials shown by tests, and retest as necessary to ensure tightness.

3. After systems have been made tight, provide a supervised program of chemical cleaning and degreasing prior to start up. Program shall be supervised by the manufacturer of the chemicals involved and upon completion of the cleaning operation manufacturer shall provide a letter certifying that the cleaning program has been completed in accordance with these specifications. Sufficient chemicals shall be added to each system to establish a concentration of 0.5% detergent dispersant chemical containing a minimum of dioctylculfosuccinate or equal detergent and 10% dispersants containing polyacrylate and/or diphosphonate or equal. Systems shall then be circulated for a minimum of 8 hours, dumped, flushed, and refilled, with the correct corrosion inhibitors added for operation. Hand clean strainers after flushing.

4. When systems have been refilled with water, vent air from system, turn on pumps and ensure that flow has been established in all portions of systems.

C. Refrigeration System: When system is complete, but before the pipe covering has been installed, test components with dry nitrogen and make tight at equipment manufacturer's recommended test pressures. Then evacuate the system to 26" Hg. vacuum which the system shall hold for 24 hours. After passing the above tests, charge and leak test under operating conditions using electronic leak detector.

D. Air System:

1. Duct Cleaning:

a. Clean new duct system(s) and existing duct systems to be reused before testing, adjusting, and balancing.

b. Use service openings for entry and inspection.

1) Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation as recommended by insulation manufacturer. Comply with Section 236000 “Air Distribution” for access panels and doors.

2) Disconnect and reconnect flexible ducts as needed for cleaning and inspection.

3) Remove and reinstall ceiling to gain access during the cleaning process.

c. Particulate Collection and Odor Control:

1) When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.

2) When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

d. Clean the following components by removing surface contaminants and deposits:

1) Air outlets and inlets (registers, grilles, and diffusers).

2) Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.

3) Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.

4) Coils and related components.

5) Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.

6) Supply-air ducts, dampers, actuators, and turning vanes.

7) Dedicated exhaust and ventilation components and makeup air systems.

e. Mechanical Cleaning Methodology:

1) Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.

2) Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.

3) Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.

4) Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.

5) Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.

6) Provide drainage and cleanup for wash-down procedures.

7) Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

2. When system has been completed, remove all trash and dirt, leave all balancing dampers open and install specified filters in all equipment. Check all fan motors for rotation. Provide all items as required for work specified in Section 23 7000 "HVAC Testing & Balancing".

E. At the beginning of the first heating season, adjust and balance operating phases and repeat at the beginning of the first cooling season or vice versa, as the case may be, all without charge.

F. Start Up and Service:

1. The Contractor and factory authorized service representative for the **boilers, variable frequency drives, and chillers** shall place each item of such equipment into satisfactory operation with all automatic and safety devices. Further, all adjustment service required shall be performed during the warranty period. Adjustment services do not include lubricating fans or motors and does not include changing filters or adjusting belts.

2. In addition, submit equipment manufacturers' start up reports for items listed above. See Paragraph "Project Close Out", below.

3. Starting Systems:

a. Coordinate schedule for start-up of various equipment and systems.

b. Notify Owner seven days prior to start-up of each item and provide one copy of manufacturer's Operation and Maintenance instructions.

c. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

d. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

e. Verify wiring and support components for equipment are complete and tested.

f. Execute start-up under supervision of responsible (manufacturer's representative) (contractors' personnel) in accordance with manufacturers' instruction.

g. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

h. Submit a written report in accordance with Section that equipment or system has been properly installed and is functioning correctly.

1.31 WARRANTY & 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 year after date of substantial completion of the Contract. Should any defects in material, workmanship, or equipment be made known to Contractor within the one year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.

C. All reciprocating and scroll refrigeration compressors shall bear 5-year non-pro-rated parts warranty.

D. All gas fired air furnaces shall bear 10 year prorated heat exchanger warranties.

E. After completion of the work, Contractor shall operate the equipment which he installs for a period of (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.

F. Provide PDF of manufacturer's operating and maintenance manuals and parts lists for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency thereof. Include all warranty dates on equipment and guarantees.

G. Any work performed on new or existing air conditioning/refrigeration equipment, whether inside or out, that requires removing the refrigerant from the system will require the use of a recovery/recycling unit. Intentional release of the refrigerant, regardless of type, will not be allowed.

H. Any refrigerant removed from a system that has been properly recycled and has not been exposed to "burn out" can and should be reused in the system. Refrigerant that has been contaminated and cannot be reused after being properly recycled shall be reclaimed by the contractor and returned to the proper company representative.

I. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.

J. 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.

K. Make available to the Owner, without additional cost, warranty service and adjustment of the equipment for the guarantee period. Due to critical temperature guidelines Contractor shall respond to Owner's call for service within a 6 hour time period.

1.32 PROJECT CLOSE OUT:

A. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:

1. A letter signed by the subcontractors for HVAC, electrical, temperature control work stating that they have jointly checked each power circuit and control circuit and mutually agree that each item is properly wired and that controls and power circuits will function properly.

2. Record drawings sheet metal work: PDF files and CAD files.

3. Record drawings – piping: PDF files and CAD files.

4. Record drawings control systems: PDF files and CAD files.

5. Control manufacturer's letter of certification.

6. Air balance report PDF files. (See Section 23 7000 "HVAC Testing & Balancing").

7. Water balance report PDF files. (See Section 23 7000 "HVAC Testing & Balancing").

8. Equipment Submittal Data PDF files.

9. Equipment operating and maintenance manuals PDF files.

10. Maintenance schedule.

11. Equipment warranty dates and guarantees.

12. Pressure vessel certificates.

13. List of Owner's Personnel who have received maintenance instructions.

14. Install valve charts in Mechanical Rooms.

15. Letter certifying that the cleaning program for the chilled water, and hot water systems has been completed in accordance to the specifications.

16. Letter certifying and signed by Owner or his representative that the Owner or his representative has received the spare filters and pump seals specified for each HVAC system.

17. Submit factory start-up reports for:

    a. Boilers

    b. Variable frequency drives

    c. Chillers

18. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

19. Pete’s plug test kits.

20. The Alabama Boiler and Pressure Vessel Permit.

21. The Alabama Department of Environmental Management Permit.

1.33 GENERAL COMMISSIONING REQUIREMENTS

A. SUMMARY

1. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.

B. DEFINITIONS

1. BoD: Basis of Design.

2. CxA: Commissioning Authority.

3. OPR: Owner's Project Requirements.

4. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

5. TAB: Testing, Adjusting, and Balancing.

C. COMMISSIONING TEAM

1. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

2. Members Appointed by Owner:

a. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.

b. Representatives of the facility user and operation and maintenance personnel.

c. Architect and engineering design professionals.

D. OWNER'S RESPONSIBILITIES

1. Provide the OPR documentation to the CxA and each Contractor for use in developing the commissioning plan; systems manual; operation and maintenance training plan; and testing plans and checklists.

2. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:

a. Coordination meetings.

b. Training in operation and maintenance of systems, subsystems, and equipment.

c. Testing meetings.

d. Demonstration of operation of systems, subsystems, and equipment.

3. Provide utility services required for the commissioning process.

4. Provide the BoD documents, prepared by Architect and approved by Owner, to the CxA and each Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

E. CONTRACTOR'S RESPONSIBILITIES

1. Provide utility services required for the commissioning process.

2. Each Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

a. Participate in maintenance orientation and inspection.

b. Participate in operation and maintenance training sessions.

c. Participate in final review at acceptance meeting.

d. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.

e. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

f. Review and approve final commissioning documentation.

3. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

a. Participate in design- and construction-phase coordination meetings.

b. Participate in maintenance orientation and inspection.

c. Participate in procedures meeting for testing.

d. Participate in final review at acceptance meeting.

e. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.

f. Provide information to the CxA for developing construction-phase commissioning plan.

g. Participate in training sessions for Owner's operation and maintenance personnel.

h. Provide updated Project Record Documents to the CxA on a daily basis.

i. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified in Division 1 Section "Operation and Maintenance Data."

j. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.

F. CxA'S RESPONSIBILITIES

1. Organize and lead the commissioning team.

2. Prepare a construction-phase commissioning plan. Collaborate with each Contractor and with subcontractors to develop test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.

3. Review and comment on submittals from each Contractor for compliance with the OPR, BoD, Contract Documents, and construction-phase commissioning plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BoD.

4. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.

5. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.

6. Observe and inspect construction and report progress and deficiencies. In addition to compliance with the OPR, BoD, and Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.

7. Prepare Project-specific test and inspection procedures and checklists.

8. Schedule, direct, witness, and document tests, inspections, and systems startup.

9. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.

10. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

G. COMMISSIONING DOCUMENTATION

1. Index of Commissioning Documents: CxA shall prepare an index to include storage location of each document.

2. OPR: A written document, prepared by Owner, that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

3. BoD Document: A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

4. Commissioning Plan: A document, prepared by CxA, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited to the following:

   a. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.

   b. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.

   c. Identification of systems and equipment to be commissioned.

   d. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.

   e. Identification of items that must be completed before the next operation can proceed.

   f. Description of responsibilities of commissioning team members.

   g. Description of observations to be made.

   h. Description of requirements for operation and maintenance training, including required training materials.

   i. Description of expected performance for systems, subsystems, equipment, and controls.

   j. Schedule for commissioning activities with specific dates coordinated with overall construction schedule.

   k. Identification of installed systems, subsystems, and equipment, including design changes that occurred during the construction phase.

   l. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.

m. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.

n. Step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.

5. Test Checklists: CxA, shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in Division 01 Section "HVAC Commissioning Requirements." Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

   a. Name and identification code of tested item.

   b. Test number.

   c. Time and date of test.

   d. Indication of whether the record is for a first test or retest following correction of a problem or issue.

   e. Dated signatures of the person performing test and of the witness, if applicable.

   f. Individuals present for test.

   g. Deficiencies.

   h. Issue number, if any, generated as the result of test.

6. Certificate of Readiness: Certificate of Readiness shall be signed by each Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing. Completed test checklists signed by the responsible parties shall accompany this certificate.

7. Test and Inspection Reports: CxA shall record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application shall be included with data. CxA shall compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

8. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.

9. Issues Log: CxA shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.

   a. Creating an Issues Log Entry:

      1) Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.

2) Assign a descriptive title of the issue.

3) Identify date and time of the issue.

4) Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.

5) Identify system, subsystem, and equipment to which the issue applies.

6) Identify location of system, subsystem, and equipment.

7) Include information that may be helpful in diagnosing or evaluating the issue.

8) Note recommended corrective action.

9) Identify commissioning team member responsible for corrective action.

10) Identify expected date of correction.

11) Identify person documenting the issue.

b. Documenting Issue Resolution:

1) Log date correction is completed or the issue is resolved.

2) Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.

3) Identify changes to the OPR, BoD, or Contract Documents that may require action.

4) State that correction was completed and system, subsystem, and equipment is ready for retest, if applicable.

5) Identify person(s) who corrected or resolved the issue.

6) Identify person(s) documenting the issue resolution.

c. Issues Log Report: On a periodic basis, but not less than for each commissioning team meeting, CxA shall prepare a written narrative for review of outstanding issues and a status update of the issues log. As a minimum, CxA shall include the following information in the issues log and expand it in the narrative:

1) Issue number and title.

2) Date of the identification of the issue.

3) Name of the commissioning team member assigned responsibility for resolution.

4) Expected date of correction.

10. Commissioning Report: CxA shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BoD, and Contract Documents. The commissioning report shall include, but is not limited to, the following:

    a. Lists and explanations of substitutions; compromises; variances in the OPR, BoD, and Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the OPR, BoD, and Contract Documents and those that do not meet requirements of the OPR, BoD, and Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.

    b. OPR and BoD documentation.

    c. Commissioning plan.

    d. Testing plans and reports.

    e. Corrective modification documentation.

    f. Issues log.

    g. Completed test checklists.

    h. Listing of off-season test(s) not performed and a schedule for their completion.

11. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:

    a. OPR and BoD, including system narratives, schematics, and changes made throughout the Project.

    b. Project Record Documents as specified in Division 1 Section "Project Record Documents."

    c. Final commissioning plan.

    d. Commissioning report.

    e. Operation and maintenance data as specified in Division 1 Section "Operation and Maintenance Data."

12. SUBMITTALS

    a. Commissioning Plan Prefinal Submittal: CxA shall submit two hard copies of prefinal commissioning plan. Deliver one copy to each Contractor, one to Owner, and one to Architect. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final construction-phase commissioning plan.

b. Commissioning Plan Final Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of final commissioning plan. Deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments. The final submittal shall include a copy of the prefinal submittal review comments along with a response to each item.

c. Test Checklists and Report Forms: CxA shall submit sample checklists and forms to each Contractor quality-control manager and subcontractors for review and comment. Submit two copies of each checklist and report form.

d. Certificates of Readiness: CxA shall submit Certificates of Readiness.

e. Test and Inspection Reports: CxA shall submit test and inspection reports.

f. Corrective Action Documents: CxA shall submit corrective action documents.

g. Prefinal Commissioning Report Submittal: CxA shall submit two hard copies of the prefinal commissioning report. Include a copy of the preliminary submittal review comments along with CxA's response to each item. CxA shall deliver one copy to Owner and one copy to Architect. One copy, with review comments, will be returned to the CxA for preparation of final submittal.

h. Final Commissioning Report Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of the final commissioning report. CxA shall deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments and shall include a copy of the prefinal submittal review comments along with a response to each item.

13. QUALITY ASSURANCE

a. Instructor Qualifications: Factory-authorized service representatives, experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

b. Test Equipment Calibration: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

14. COORDINATION

a. Pretesting Meetings: CxA shall conduct pretest meetings of the commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

b. Testing Coordination: CxA shall coordinate sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1) Schedule times for tests, inspections, obtaining samples, and similar activities.

c. Manufacturers' Field Services: CxA shall coordinate services of manufacturers' field services.

END OF SECTION

SECTION 23 1000

MATERIALS AND METHODS – HVAC

PART 1 - GENERAL

1.1 SCOPE:

A. Section 230500 - "General Provisions - HVAC" shall apply to and become part of this Section.

PART 2 - MATERIALS: (All pipe, fittings and valves shall be manufactured in the United States of America)

2.1 CHILLED WATER PIPING:

A. Schedule 40 black steel pipe, ASTM A53 or A106, grade B. Fittings 2" and smaller, 150 psig WSP black malleable iron. Fittings 2-1/2" and larger, butt welding fittings. No mitering or notching for fittings permitted. Weldolets permitted where branch size is 2 pipe sizes smaller than main. 45 degree saddles permitted where shown.

B. Unions 2" and smaller black malleable, ground joint, screwed. Union 2-1/2" and larger, flanged.

C. All flanges shall be flat faced. Flange gaskets shall be nonasbestos compressed material in accordance with ASME B16.21, minimum 1/16 in thickness, full face type. Gaskets shall contain aramid fibers bonded with styrene butadiene rubber (SBR) or nitrile butadiene rubber (NBR). Bolts, nuts, and bolt patters shall conform to ASME B16.1 Gaskets shall be Garlock Blue-Gard 3000 or approved equal.

D. Coating for underground lines: Pipe coating: Pipe shall be mill-wrapped with fittings field-wrapped with PVC tape, same thickness as mill-wrapping. Mill wrapping shall be X-TRU-COAT. Coating shall be electrically inspected for holidays.

E. At Contractor's option runouts to room fan-coil AC Units may be type L hard copper with wrought copper sweat fittings made with 95-5 solder. Install dielectric union at copper pipe connections to black steel pipe.

F. Pipe connections to chillers shall be made with Victaulic Style 741 flange adapters or flexible couplings, coordinate with chiller manufacturer.

2.2 HVAC DRAIN PIPING:

A. Standard weight galvanized steel pipe ASTM A106 with galvanized malleable iron fittings, or type L hard copper with wrought copper sweat fittings, at Contractor's option.

B. Provide drain traps for AC unit drain pans. Size traps as required to drain under operating conditions. See trap detail on drawings.

2.3 HOT WATER PIPING:

A. Schedule 40 black steel pipe, ASTM A53 or A106, grade B. Fittings 2" and smaller, 125 psig W.P. cast iron screwed fittings. Fittings 2-1/2" and larger, butt welding fittings. No mitering or notching for fittings permitted. Weldolets permitted where branch size is 2 pipe sizes smaller than main. 45 degree saddles permitted where shown.

B. Unions 2" and smaller black malleable, ground joint, screwed. Union 2-1/2" and larger, flanged.

C. All flanges shall be flat faced. Flange gaskets shall be nonasbestos compressed material in accordance with ASME B16.21, minimum 1/16 in thickness, full face type. Gaskets shall contain aramid fibers bonded with styrene butadiene rubber (SBR) or nitrile butadiene rubber (NBR). Bolts, nuts, and bolt patters shall conform to ASME B16.1 Gaskets shall be Garlock Blue-Gard 3000 or approved equal.

D. Coating for underground lines: Pipe coating: Pipe shall be mill-wrapped with fittings field-wrapped with PVC tape, same thickness as mill-wrapping. Mill wrapping shall be X-TRU-COAT. Coating shall be electrically inspected for holidays.

E. At Contractor's option runouts to room fan-coil AC Units may be type L hard copper with wrought copper sweat fittings made with 95-5 solder. Install dielectric union at copper pipe connections to black steel pipe.

2.4 REFRIGERATION PIPING:

A. Type L hard drawn copper tubing with wrought copper sweat fittings. Joints: silfossed with continuous flow of dry nitrogen through lines.

B. Size all lines per manufacturer’s recommendations and requirements based on actual line lengths, distances, and elevations, so as to ensure oil return at minimum loading.

C. Small lines 5/8" OD and smaller may be soft copper with flare fittings, provided that all joints are exposed for visual inspection.

D. Refrigerant piping shall not be left open for a period longer than necessary to assemble the piping, provide nitrogen flow, and solder. In no case shall any piping assembled or stored be left open at the end of the day. Pipe that is assembled but not soldered is open. Piping that is stored shall not be used if it has lost the manufacturer’s nitrogen charge.

E. Refrigerant piping shall be protected against physical damage. Refrigerant piping installed in studs, joists, rafters or similar member spaces, and located less than 1-1/4 inches (32 mm) from the nearest edge of the member, shall be continuously protected by shield plates. Protective steel shield plates shall cover the area of the tube plus the area extending not less than 2 inches (51 mm) beyond both sides of the tube. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.46 mm) (No. 16 gage).

2.5 HVAC VALVES:

A. Hot Water and Chilled Water Valves:

1. Gate valves 2" and smaller: All bronze, 150 psig WSP, threaded ends, rising stem, union bonnet, solid disc, Nibco #T-134, Milwaukee #1151, or Watts B-3100.

2. Gate valves 2-1/2" and larger: Flanged, iron body, brass trim, 125 psig WSP, wedge disc, non-rising stem, Nibco #F-619, Milwaukee #F-2882-A Domestic, or Watts F502.

3. Globe valves 2" and smaller: All bronze, 150 psig WSP, composition disc, rising stems, Nibco #T-235Y, Milwaukee #590T, or Watts B-4010-T.

4. Globe valves 2-1/2" and larger: Iron bodies, brass trim, 125 psig WSP, flanged, Nibco #F-718B, Milwaukee #F-2981-A, or Watts F-501.

5. Check valves 2" and smaller: 125 psig WSP, threaded ends, brass or bronze body, spring loaded, composition disc, Metraflex, Nibco #T-480Y, Watts #600, or Techno 5002-BR.

6. Check valves 2-1/2" and larger: 125 WSP, spring loaded, non-slam, center guide, globe check valves for installation between faces of 125# cast iron ASA 150 flanges, iron body, bronze seat and disc, stainless steel spring. Metraflex style 900, Nibco F-910, or equal by Keystone, Milwaukee, or Watts. Install a minimum of 5 pipe diameters from pump discharge.

7. Ball valves for hot water: 600 psig WOG, screwed bodies, chrome plated bronze balls, full port, teflon packing, bronze stem and steel handle, suitable for 350°F operating temperature. Include valve handle extension to clear 2" insulation. Nibco Nib-Seal T585-70 (domestic), full port. Provide extension stem capable of clearing 2" insulation, with memory stop, when operated will not disturb vapor seal of insulation.

8. Ball valves for chilled water: 600 psig WOG, screwed bodies, chrome plated, full port, bronze ball, TFE packing, bronze stem and extended handle to accommodate 2" of insulation. Nibco Nib-Seal, T585-70 (domestic), Apollo 77C with thermal seal handle, full port. Provide non-metallic extension stem capable of clearing 2" insulation, with memory stop, when operated will not disturb vapor seal of insulation.

9. Butterfly valves: 200 psi WSP, designed for installation between ASA 150 flanges. Valves shall have ductile iron bodies with tapped lugs for independent bolting to upstream and downstream flanges, bubble tight (rated for bi-directional "dead end" service) under full-rated pressure with no flange on downstream side. Aluminum-Bronze discs, 416 stainless steel stems, EPDM seats and stem seals, extended neck at least 2" beyond OD of flanges, lever handles with infinite throttling and memory stops for valves 6" and smaller, gear operators with memory stops capability for valves 8" and larger. Valves shall be rated for 250°F operating temperature. Provide padlock connections for valves located outdoors. Nibco LD-2000, Demco - NEC5114351 or Dezurik - BG5XLIDIEBS2.

B. For all valves over 7 feet above the floor, provide chain wheels with chains extending to 6-1/2 feet above the floor.

C. Control valves: Specified in Control/BAS/DDC Section.

D. Non-return (Stop-Check) valves: 250 psig, flanged, angle Y pattern, iron body, nickel plated steel stems, bronze seat rings, NIBCO #F-869B, or Watts F-526.

2.6 PIPE HANGERS:

A. Pipe hangers above ceiling / high in space shall be attached to structure as allowed by structural engineer. Hangers shall not be attached to roof deck or other non-structural items.

B. General: Pipe hangers, Anvil, PHD, Michigan Hanger, B-Line or Elcen. Anvil figure numbers are given for reference. Provide copper clad or plastic coated hangers on bare copper lines.

C. Pipe hangers for lines 3" and smaller: adjustable wrought ring hangers, Anvil Fig. 97 or 69 or wrought clevis hangers.

D. Pipe hangers for piping 4" and larger: adjustable wrought clevis hangers.

E. 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.

F. Provide riser clamps on pipe risers on each floor. Clamps in contact with copper or plastic pipe, plastic coated.

G. Beam Clamps: Anvil Fig. 228.

H. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts. Anvil Fig. 282.

I. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (powder driven anchors are not acceptable).

J. 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", 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.

K. Space pipe hangers at maximum: Pipe hanger spacing for screwed, solder joint and welded piping: 1/2" and 3/4", 6 ft.; 1" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3” and over, 12 ft. Install additional hangers at change of direction, valve clusters, and at all duct and unit mounted coils.

L. Install pipe hangers on insulated pipe over pipe covering. Provide factory fabricated insulated pipe shields equal to Pipe Shields, Inc. "Thermal Hanger Shields" or Tru-Balance insulated saddles at hangers. Provide shield insulation of rigid calcium silicate indoors or rigid Perlite Silicate outdoors, the same thickness as adjacent pipe covering. (At Contractor's option, pipe shields may be field fabricated using rigid calcium silicate or foamglass insulation with ASJ and 20 gauge galvanized steel protector. Shield length: 1.5 times nominal pipe size but not less than 4".)

M. Wrap bare copper refrigerant lines with sheet lead or molded plastic sleeve at hangers.

2.7 THERMOMETERS AND GAUGES:

A. Non-mercury in glass blue reading separable socket industrial thermometers with die cast aluminum or high impact plastic casings of appropriate pattern for each installation, 9” scale lengths and ranges shown, Palmer, Trerice or Weksler. Install thermometers in brass or stainless steel wells. Equip thermometers installed in insulated lines with 1” extension stems or stems long enough to permit unions to clear insulation whichever is greater.

B. Where shown install brass thermometer wells with screwed caps. Install wells at an angle to retain oil. Size well to fit thermometers specified.

C. Enlarge pipe 2" and smaller to 2-1/2" at thermometers and thermometer wells.

D. Install 4-1/2" dial pressure gauges where shown. Gauges shall have bronze or stainless steel bourdon tubes, 316 stainless steel movement, aluminum or polypropylene solid front cases, adjustable micrometer pointer and accuracy Grade 2A not less than 1/2% of full scale over the entire range, without mounting flange. Gauges shall be Ashcroft 1279, Marsh Series P01, Trerice 450-B, Weksler AA44-2 or U.S. Gauge 1980L with minimum bourdon tube diameter of 3". Provide ball valves for all pressure gauges. Provide siphons for steam gauges.

E. Where shown, provide temperature and pressure measurement plugs and caps equal to Peterson Equipment Co., Inc. "Pete's plug with Nordel seats and seals". Provide one Pressure and Temperature Kit consisting of a 0-100 psi pressure gauge with adaptors, and two thermometers (25-125°F and 0-220°F), all in carrying cases. Provide nipples for Pete's plugs as required to extend thru pipe insulation.

2.8 ELECTRIC PIPE LINE HEATERS:

A. Electric heaters equal to Chemetron "Auto-Trace," Letco with "Self Regulator" or Chromolox "Self Regulating Rapid Trace" heating cable, 3.9 watts/foot to prevent freezing in 0°F ambient. Equip heaters with conduit connectors and outdoor thermostat set at 32°F.

B. Extent:

1. All chilled water supply and return lines outdoors exposed to freezing temperatures.

2. Domestic water piping in unheated areas or exposed outdoors. Include aluminum jacket.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION:

A. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.

B. For glycol solutions, joints on black steel screwed pipe made up with thread sealant compatible with glycol; Rectorseal No. 7, or equal.

C. Provide welding material and labor in accordance with the welding procedures of the Heating, Piping, and Air Conditioning Contractors' National Association or other approved procedure conforming to the requirements of ANSI B31.9 "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 oxyacetylene welding. Provide full perimeter welds 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 springing of pipes during assembly.

E. Pitch air conditioning unit drain lines down in direction of flow 1/8" per foot of horizontal run. Grade chilled and hot water supply and return lines down to drains and up to air vents.

F. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.

G. Make horizontal water supply line size reductions using eccentric reducers (tops flat in water lines).

H. Install 3/4" ball valve drains with hose adaptors at low points of water piping and at bases of all risers (where shown provide larger drains). Provide screwed caps with chains on hose adaptors.

I. 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 unions on all sides of control valves.

J. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulating unions or couplings, equal to Victaulic style 47, "V-line" insulating couplings as manufactured by Lochinvar, thread to thread or CTS fabrication flange adaptors for flange connections.

K. Near heating and air conditioning equipment requiring water provide valved and capped water outlets of sizes shown for connection to equipment, including reduced pressure principal backflow preventers. Make final connections under HVAC work. Note that all piping and insulation downstream from backflow preventer must be painted yellow.

L. Run piping concealed, except where specifically shown or specified to be exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise.

M. Lay underground pressure piping so top of pipe is at least 18" below finished grade. Support all underground piping solidly along body of pipe. Strongly suspend other piping from building construction.

N. Pipe shall be braced at flexible connections to prevent blowouts under operating conditions.

O. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two wrappings of polyvinyl chloride tape or equivalent protection approved by Architect.

3.2 INSTALLATION OF VALVES:

A. Provide shut-off valves in supply and return connections to each item of equipment. Locate valves to isolate each item to facilitate maintenance and/or removal.

B. Provide check valve in discharge line adjacent to each pump.

C. Locate valves in piping connections to coils, boilers, heat exchangers, chiller, etc., so heads and tube bundles can be removed without disconnecting equipment or piping other than union or flange connections immediately adjacent to the equipment.

D. Provide sweat to screw adaptors where required.

E. Install with valve stems upright or horizontal.

END OF SECTION

SECTION 23 1500

THERMAL AND ACOUSTICAL INSULATION FOR HVAC SYSTEMS

PART 1 - GENERAL

1.0 GENERAL:

A. All external duct insulation and flexible duct shall be legibly printed or identified at intervals not greater than 36 inches with the name of the manufacturer, the thermal resistance R-value at the specified installed thickness and the flame spread and smoke-developed indexes of the composite materials.

B. All insulation (except duct liner) shall be installed by an insulation contractor in business a minimum of 3 years as an insulation contractor and has completed projects similar in scope to this project. Submit insulation contractor qualifications.

C. The installation of all insulation shall comply with the requirements of the contract documents unless specifically noted and approved in submittal document. Compliance with contract documentation shall be demonstrated by the insulation contractor as follows:

1. Specific and random selections of the installed insulation shall be removed by the insulation contactor for observation by the owner's representative. The insulation samples removed shall be selected by the owner's representative.

2. The insulation removed per observation selection shall not exceed 6 linear feet of piping insulation (including fittings) or 4 sq. ft. of ductwork or equipment insulation if the sample removed indicates compliance with the contract documents. If the sample removed does not indicate compliance with the contract documents, additional samples shall be removed for observation as directed by the owner's representative up to a total of 4 samples.

3. The total number of observations shall not exceed 10 per project unless the installation of the insulation is found not to comply with the contract documents. Otherwise, the total number of observations shall be as required by the owner's representative to confirm compliance.

4. If the insulation is found not to be installed as required by the contract documents, the insulation shall be removed and new insulation installed to comply with the specifications. After completion of the new insulation, the testing procedure noted above shall be repeated.

1.1 SCOPE:

A. Section 23 0500 - "General Provisions – HVAC" shall apply to and become part of this Section.

B. Repair existing insulation at points of connection and/or alterations to existing work.

C. "Exposed" is defined as: Exposed to view when construction is complete. (Items which are not "exposed" are considered "concealed".)

D. The use of any material containing asbestos is strictly prohibited.

E. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

1.2 INSULATION:

A. Comply with NFPA 90A.

B. Pipe hanger shields are specified in Section 23 1000 - "Materials and Methods - HVAC."

C. Use insulation and adhesives with Underwriter's Laboratories and ASTM E-84 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 casings.

2. 150 for all other pipe, duct and equipment insulation.

PART 2 - MATERIALS

2.1 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. 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 and flanged unions. Do not cover screwed unions on hot lines. Finish concealed fittings with a skim-coat of mastic and when mastic is dry, fitting shall be covered with glass fab and vinyl acrylic mastic unless otherwise noted below. Zeston type fitting covers may be substituted for glass fab and final coat of mastic on concealed fittings provided fire and smoke ratings are met. Finish fittings exposed in equipment rooms, boiler room, and in finished spaces with vinyl acrylic mastic over glass fab over mastic.

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 over skim coat of mastic shall be applied around main, lapping contoured joint at branch by 2" minimum for the full 360° 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.

2.2 CELLULAR GLASS PIPE COVERING, RIGID:

A. Cellular glass insulation having a maximum K factor at 50°F mean temperature not exceeding 0.28, and a compressive strength not less than 87#/sq. in., Pittsburgh Corning "Foamglas".

B. Apply pipe covering in a single layer. Tightly butt and butter all joints and seams with vapor barrier mastic. Finish with a UL rated vapor barrier laminate of aluminum foil and Kraft reinforced with fiberglass yarn. Seal all laps and butt strips with suitable adhesive and cover with coat of vinyl acrylic mastic.

C. Insulate fittings with prefabricated or field fabricated fitting covers of the same material, buttered with mastic, securely held in place with stainless or copper wire with twisted ends turned in or fiberglass packing tape. Finish with glass fab over vinyl acrylic mastic with flooding coat of mastic applied over fabric.

D. Fit pipe hangers over insulation (See PIPE HANGERS). Hanger Shields are specified under pipe hangers.

E. Finish piping and fittings on outdoor piping with aluminum jacket (see below).

2.3 FOAMED PLASTIC PIPE COVERING: (DO NOT USE IN PLENUMS UNLESS COMPLIES WITH PARAGRAPH 1.2 ABOVE):

A. Fire retardant foamed plastic pipe covering, maximum K factor at 75°F mean temperature not exceeding 0.27 BTU/(hr)(sq.ft.)(°F/in).

B. Pipe covering may be seamless insulation slipped over piping before erection or may be slit longitudinally and installed over erected piping.

C. Make fitting covers from segments of pipe covering.

D. Cement all joints and seams in accordance with manufacturer's instruction.

E. Fit pipe hangers over insulation (see PIPE HANGERS). Use hanger shields as specified under pipe hangers.

F. Where exposed outside, cover insulation with aluminum jacket (see below).

G. Armacell, Aeroflex or Normaco.

2.4 ALUMINUM JACKET (PIPING):

A. 0.016" thick smooth aluminum jacket with laminated polyethylene and kraft paper adhered liner.

B. Roll jacket slightly smaller than insulation diameter and secure in place with flat aluminum bands 12” o.c. Lap jacket minimum 2” and place overlap at ± 120° arranged to shed water.

C. Finish fittings on aluminum jacketed lines with 1/8" thick (dry) coat of vinyl acrylic mastic reinforced with glass cloth. In addition, provide preformed aluminum fitting jackets for outdoor fittings.

D. Seal all joints on fitting covers with silicone sealant.

2.5 SPEEDICHANNEL (PIPING ENCLOSURE) BY DIVERSITECH:

A. For refrigerant line sets, mini-split wall mounted evaporator indoor units, condensate drains, etc., install SpeediChannel enclosure for piping from indoor unit to outdoor unit per manufacturer’s instructions.

B. Include all components in natural or white finish made of UV resistant resin.

C. www.diversitech.com

2.6 HOT EQUIPMENT INSULATION:

A. 11 lbs. per cu. ft. density molded hydrous calcium silicate with a maximum K factor of 0.42 at 200 degrees °F mean temperature, similar to Kaylo.

B. Secure with galvanized steel wire or band with 1/2" x 0.015 galvanized steel bands on 12" centers.

C. Fill and point all joints and voids of insulation with mineral wool insulating cement. Next, cover all the insulation with a smoothing coat of finishing cement.

D. Finish exposed equipment with glass cloth imbedded in vinyl acrylic mastic.

E. Insulate sections of equipment requiring periodic servicing with sheet metal casings filled with the same thickness of material as the adjoining insulation.

2.7 COLD EQUIPMENT INSULATION (FOAMED PLASTIC): (DO NOT USE IN PLENUMS UNLESS COMPLIES WITH PARAGRAPH 1.2 ABOVE)

A. Fire-retardant foamed plastic insulating board having a thermal conductivity at 75°F mean temperature not exceeding 0.27 BTU/(hr) (sq.ft.) (°F/in.). Fasten in place and seal joints with adhesive in accordance with insulation manufacturer's instructions.

B. Finish: Vimaso 749 vapor-block mastic – color grey.

C. Armacell, Aeroflex or Normaco.

2.8 DUCT INSULATION, EXTERNAL, FOR CONCEALED DUCTS:

A. Flexible glass fiber insulation with foil-scrim-kraft (FSK) facing. Flame spread classification, 25 or less, smoke developed rating not exceeding 50. Minimum density, 1 lb./cu. ft., maximum thermal conductivity at 75°F mean temperature 0.26 BTU/(hr)(sq. ft.)(°F/in).

B. Fire-retardant foamed plastic insulating board having a thermal conductivity at 75° mean temperature not exceeding 0.27 BTU/(hr)(sq.ft.)(°F/in.). Fasten in place and seal joints with adhesive in accordance with insulation manufacturer’s instructions.

1. Finish: Vimaso 749 vapor-block mastic – color grey.

2. Armacell, Aeroflex or Normaco.

2.9 DUCT INSULATION, EXTERNAL, FOR EXPOSED INDOOR DUCTS (IN MECHANICAL ROOM):

A. Fire retardant foamed plastic insulation. Paint with Vimaso 749 vapor-block mastic – color grey. (Do not use in plenums unless complies with Article 1.2.) Armacell, Aeroflex or Normaco.

B. 6 lb/cu. ft. fiberglass board with FSK facing and thermal conductivity not exceeding 0.22 BTU/(hr)(sq.ft)(°F/in) at 75°F mean temperature.

2.10 DUCT INSULATION, EXTERNAL, FOR EXPOSED OUTDOOR DUCTS:

A. 6 lb/cu. ft. fiberglass board with FSK facing and thermal conductivity not exceeding 0.22 BTU/(hr)(sq.ft)(°F/in) at 75°F mean temperature.

B. Cover insulation with aluminum jacket sealed weather tight.

PART 3 - INSTALLATION

3.1 HVAC PIPING:

A. hot water supply and return piping; indoors above grade: “Fiberglass pipe covering”, thickness per Table 1.

TABLE 1

INSULATION THICKNESS FOR HVAC HOT PIPING

Service	Runouts		Mains & Risers			
	Up to 1-1/2"	Up to 2"	Up to 1-1/2"	2-1/2" to 4"	5" to 6"	8" and Up
Hot Water	1-1/2"	2"	1-1/2"	2"	2"	2"

* Runouts over 12 feet in length shall be classed as mains.

B. Chilled water supply and return piping indoors above grade: “Cellular glass Pipe Covering, Rigid”, 1" thick for lines 2-1/2" and smaller, 1-1/2" thick for lines 3" and larger. (Jacket exposed lines with aluminum jacket).

C. Room fan coil AC unit chilled water runouts: “Foamed plastic Pipe Covering”, 3/4" thick.

D. Chilled water supply and return lines outdoors above grade: Cellular glass pipe covering, 1-1/2" thick over electric pipeline heaters. Jacket with aluminum jacket.

E. Chilled water supply and return piping outdoors below grade: “Cellular glass pipe covering”, 1" thick for lines 2-1/2" and smaller, 1-1/2" thick for lines 3" and larger. Jacket with 2 layers 55# roofing felt or 4 layers 30# secured with 14 gauge stainless steel wire loops 12" on center.

F. Refrigerant suction lines and hot gas bypass lines: “Foamed plastic pipe covering”, 3/4" thick.

G. AC Unit drain lines: “Foamed Plastic Pipe Covering”, 1/2" thick.

H. Non-potable water lines outdoors above grade: As specified for chilled water and/or condenser water lines outdoors above grade over electric pipeline heaters.

I. Non-potable water lines downstream of backflow preventer shall be insulated the same as hot water piping, indoors above grade.

3.2 HOT EQUIPMENT:

A. Air Separators: “Fiberglass Pipe Covering”, 2" thick.

B. Boiler Blowdown Separator: “Hot Equipment Insulation”, 1-1/2" thick.

3.3 COLD EQUIPMENT:

A. Cold water chiller surfaces: cold equipment insulation, rigid, 1-1/2" thick.

B. Chilled water compression tanks: cold equipment insulation, rigid, 1" thick.

C. Chilled water one-shot chemical feeders: cold equipment insulation, rigid 1" thick.

D. Chiller heads and chilled water pumps: 1" thick foamed plastic insulation inside easily removable 20 gauge galvanized steel covers.

E. Insulation for Strainers in chilled water lines:

1. Equip with 20 gauge galvanized steel covers. Split along strainer centerline and secure with diecast latches. Insulate inside covers with 1" thick foamed plastic insulation. Provide gasketed openings for blow-down valves.

F. Insulation for flexible connections in water lines:

1. Build up insulation to thickness of adjacent pipe covering using foamed plastic sheet with joints sealed and staggered. Last layer shall lap adjacent pipe covering 3" and be sealed and banded to it.

G. Insulation for casings, return bends and headers of duct mounted coils: 1/2" thick foamed plastic.

3.4 DUCT INSULATION, EXTERNAL, FOR CONCEALED DUCTS:

A. For flexible glass fiber insulation:

1. Lap jacket and vapor seal all joints and seams with suitable mastic.

2. On rectangular and flat oval ducts 30" wide (30" flat on flat oval ducts) and wider, support insulation with weld pins and speed clips 18" on centers. Seal weld pins with mastic and FSK tape.

3. Thickness and Extent: All sheet metal supply and outside air ducts not specified to be lined: Minimum 2" thick except as noted below. Note: Conical and straight spin-ins on both lined and unlined ducts shall be insulated as noted below. (See Foamed Plastic Insulation below.)

B. All metal surfaces of ceiling diffuser (CD) located above the ceiling: 2" thick (seal air tight to diffusers).

C. Foamed Plastic Insulation:

1. Insulate portions of fire damper sleeves in insulated ducts, which are not concealed in walls, partitions and floors as specified with 3/4" thick foamed plastic insulation. Do not extend the insulation through the wall, floor or partition. Seal to wall and glass fiber insulation (or if lined duct seal foamed plastic insulation to duct with 3" lap over liner). On externally insulated duct, lap glass fiber insulation over foamed plastic and seal to foamed plastic.

2. Insulate all flexible connectors in sheet metal ducts with 1" thick foamed plastic sheet with joints sealed. Extend insulation minimum 3" upstream and downstream of flex connector joints and seal to sheet metal duct.

3. Insulate portions of lined ducts at manual dampers with 3/4" thick foamed plastic insulation overlapping the liner a minimum 3" upstream and downstream of the damper. Seal foamed plastic insulation to duct.

4. Insulate all casings, headers and return bends on duct-mounted coils, and coils at terminal units with 3/4" thick foamed plastic insulation. Headers and return bends shall be insulated with 3/4" foamed plastic cemented inside galvanized sheet metal covers gasketed to coil casing.

5. Insulate all unlined ducts with dampers, all conical branch duct fittings and straight branch duct spin-ins with 3/4" thick foamed plastic insulation. Glass fiber insulation on the branch ducts shall overlap foamed plastic insulation on the conical fittings and spin-ins. Seal fiberglass to foamed plastic. For connections of flexible duct to spin-ins or conical branch duct fittings, connect flexible duct inner liner to sheet metal with specified clamps and lap outer liner and insulation over foamed plastic and clamp with Panduit strap. Seal flex duct outer cover to spin-in or conical fitting insulation. Insulation contractor shall submit sample of spin-in and conical fitting insulation and flexible duct connection for approval.

D. Insulate portions of fire damper sleeves in insulated ducts which are not concealed in walls, partitions and floors as specified in A or B above. Do not extend the insulation through the wall, floor or partition.

3.5 DUCT INSULATION, EXTERNAL, FOR EXPOSED DUCTS:

A. Insulate all exposed supply, return and outside air ducts and exposed return bends, headers and casings of all duct mounted coils not specified to be lined with 1" thick foamed plastic insulation cemented in place with adhesive in accordance with insulation manufacturer's instructions.

B. Insulate all exposed supply, return and outside air ducts located in Mechanical Room with 2" thick 6#/cu. ft. fiberglass board with FSK jacket. Secure board with weld pins and speed clips 12" on centers. Seal clip indentations with mastic. Seal all joints and seams with mastic.

C. Cover all angles, seams and joint reinforcing with insulation and seal vapor tight.

3.6 DUCT INSULATION, EXTERNAL, FOR EXPOSED OUTDOOR DUCTS:

A. Insulate all exposed outdoor supply, return and outside air ducts with 2" thick 6#/cu. ft. fiberglass board with FSK jacket. Secure board with weld pins and speed clips 12" on centers. Seal clip indentations with mastic. Seal all joints and seams with mastic.

B. Cover all angles, seams and joint reinforcement with insulation and seal vapor tight. Finish with aluminum jacket cover sealed weather tight.

C. In addition, line duct with fire-retardant foamed plastic insulating board having a thermal conductivity at 75˚ mean temperature not exceeding 0.27 BTU/(hr)(sq.ft.)(˚F/in.). Fasten in place and seal joints with adhesive in accordance with insulation manufacturer's instructions.

END OF SECTION

SECTION 23 5000

HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES

PART 1 - GENERAL

1.1 SCOPE:

A. Section 23 0500 – "General Provisions – HVAC" shall apply to and become part of this Section.

PART 2 - EQUIPMENT AND SPECIALTIES

2.1 DEHUMIDIFIERS

A. U.L. labeled refrigerated dehumidifiers consisting in general of an evaporator coil, condenser coil, fan motor and fans, refrigeration compressor, drain pan, and controls all enclosed in a heavy gauge steel cabinet with baked enamel finish.

B. Santa Fe or approved equal.

2.2 HOT WATER CONDENSING BOILERS – NATURAL GAS

A. SUMMARY

1. This Section includes packaged, factory-fabricated and assembled, gas-fired, firetube duplex alloy stainless steel ultra-high efficiency condensing boilers, trim and accessories for generating hot water.

B. REFERENCES

1. ASME Section IV
2. CSD-1, Controls and Safety Devices
3. XL GAPS
4. NEC, National Electric Code
5. UL-795 7th Edition
6. AHRI, BTS-2000
7. ASHRAE 90.1

C. SUBMITTALS

1. Product Data: Include performance data, operating characteristics, technical product data, rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.

2. Shop Drawings: For boiler, standard boiler trim and accessories.

   a. End Assembly Drawing: Detail overall dimensions, connection sizes, connection locations, and clearance requirements.

   b. Wiring Diagrams: Detail electrical requirements for the boiler including ladder type wiring diagrams for power, interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

3. Certificate of Product Rating: Submit AHRI Certificate indicating Thermal Efficiency, Combustion Efficiency, Materials of Construction, Input, and Gross Output conform to the design basis.

4. Thermal efficiency curves: Submit thermal efficiency curves between and including minimum and maximum rated capacities, for return water temperatures ranging from 80°F to 180°F.

5. Water side pressure drop curve.

6. Flue gas temperature curves: Submit flue gas temperature curves for minimum and maximum boiler capacity, for return water temperatures ranging from 80°F to 160°F.

   a. If submitted flue gas temperatures, minimum or maximum inputs are different from that of the basis of design manufacturer and model, the manufacturer shall be responsible for draft calculations and reselection of the flue gas exhaust system.

7. Source quality-control test reports.

8. Field quality-control test reports: Start-up by a factory authorized service company.

9. Operation and Maintenance Data: Data to be included in Installation and Operation Manual.

10. Warranty: Standard warranty specified in this Section.

D. QUALITY ASSURANCE

1. Manufacturer Qualifications: Firms regularly engaged in the manufacture of condensing hydronic boilers with welded steel pressure vessels, whose products have been in satisfactory use in service for not less than twenty-five (25) years. The manufacturer must be privately owned and headquartered in North America. The specifying engineer, contractor and end customer must have the option to visit the factory during the manufacture of the boilers and be able to witness test fire and other relevant procedures.

2. Aftermarket Support and Service: The manufacturer shall have a factory authorized service training program, where boiler technicians can attend a training class and obtain certification to perform start-up, maintenance and basic troubleshooting specific to the product line.

3. 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.

4. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code, Section IV "Heating Boilers", for a maximum allowable working pressure of 160 PSIG.

5. CSD-1 Compliance: The boiler shall comply with ASME Controls and Safety Devices for Automatically Fired Boilers (CSD-1).

6. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

7. UL Compliance: Boilers must be tested for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by ETL.

8. AHRI Compliance: Boilers shall be tested and rated according to the BTS-2000 test standard and verified by AHRI.

9. NOx Emissions Compliance: Boiler shall be tested for compliance with SCAQMD and TCEQ.

10. The equipment shall be of the type, design, and size that the manufacturer currently offers for sale and appears in the manufacturer's current catalog.

11. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.

12. The equipment shall be new and fabricated from new materials. The equipment shall be free from defects in materials and workmanship.

13. All units of the same classification shall be identical to the extent necessary to ensure interchangeability of parts, assemblies, accessories, and spare parts wherever possible.

14. In order to provide unit responsibility for the specified capacities, efficiencies, and performance, the boiler manufacturer shall certify in writing that the equipment being submitted shall perform as specified.

E. COORDINATION

1. Mechanical contractor shall coordinate the size and location of concrete bases. Cast anchor-bolt inserts into bases.

F. WARRANTY

1. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period provided the boiler is installed, controlled, operated and maintained in accordance with the Installation, Operation and Maintenance Manual.

    a. Warranty Period for the Pressure Vessel and Heat Exchanger: The boiler manufacturer shall warranty against failure due to:

        1) Flue gas condensate corrosion, and/or defective material or workmanship for a period of ten (10) years, non-prorated, from the date of shipment from the factory.

2) Thermal shock for the lifetime of the boiler.

b. Warranty Period for the Burner: The boiler manufacturer shall warranty the mesh burner head against defective material or workmanship for a period of five (5) years, non-prorated, from the date of shipment from the factory.

c. Warranty Period for all other components: The boiler manufacturer will repair or replace any part of the boiler that is found to be defective in workmanship or material for a period of two (2) years, non-prorated, from the date of shipment from the factory.

G. MANUFACTURERS

1. This specification is based on the Endura series boilers featuring PURE Control™ as manufactured by Fulton Heating Solutions, Inc. Equivalent units by LAARS or Lochinvar must meet all performance criteria, and are acceptable.

2. Basis-of-Design Product: Subject to compliance with requirements, provide Fulton Heating Solutions, Inc.

a. Endura model duplex stainless steel firetube condensing boiler.

1) Alternate boilers must equal or exceed all aspects of this specification in its entirety throughout. Boilers seeking an approval shall provide documentation that supports this requirement.

3. The boiler manufacturer shall have the capability to construct an engineered hydronic system, skid mounted, for the above referenced boilers incorporating single point electrical, supply water, return water, fresh water make up, fuel, and drain. The boiler manufacturer shall have the engineering capabilities for all aspects of the mechanical, electrical and control design aspects of the skid mounted system.

H. CONSTRUCTION

1. Description: Factory-fabricated, -assembled, and -pressure tested, duplex stainless steel firetube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including flue gas vent; combustion air intake connections, water supply, water return, condensate drain, and controls. The boiler, burner and controls shall be completely factory assembled as a self-contained unit. Each boiler shall be neatly finished, thoroughly tested, and properly packaged for shipping. Closed-loop water heating service only.

2. Heat Exchanger: The heat exchanger is defined as the surfaces of the pressure vessel where flue gases transfer sensible and latent heat to the hydronic fluid. The heat exchanger shall be a three-pass firetube design constructed using only duplex alloys of stainless steel.

a. The boiler shall be a firetube design, such that all combustion chamber components are within water-backed areas. Watertube boilers will not be accepted.

b. Furnace: First pass of the combustion chamber shall be constructed of duplex alloy stainless steel with a minimum wall thickness of 0.25” and a minimum bottom head thickness of 0.625”.

c. Firetubes: Second and third passes of the combustion chamber shall be constructed of duplex alloys of stainless steel having a minimum wall thickness of 0.109”.

d. Furnace to tube connections shall be constructed with low weld intensity, a tube to tube minimum spacing of 2" center to center, minimum 5/8" tube to tube ligament, and shall not contain any overlapping welds.

e. Heat exchange capability shall be maximized within the heat exchanger via the use of corrugated firetube technology. The corrugation process shall not remove any material from the tubes. Aluminum heat transfer enhancements are dissimilar metals and are unacceptable.

f. Material: The heat exchanger shall have the following material characteristics and properties:

1) The metallic crystalline lattice microstructure shall contain approximately equal amounts of body center cubic (BCC) and face centered cubic (FCC) structures to offer high resistance to intergranular corrosion.

2) A minimum Pitting Resistance Equivalent Number (PREN) of 26.

3) A minimum Yield Strength of 65 ksi at 0.2% plastic strain.

4) A minimum Ultimate Tensile Strength of 94 ksi.

5) To minimize stresses caused by uneven expansion and contraction, the Coefficient of Thermal Expansion at 212°F shall not be less than 7.0 in/in °F 10-6 and shall not be greater than 7.5 in/in °F 10-6.

6) To increase resistance to pitting and crevice corrosion, the Chromium content shall not be less than 21% by mass.

7) For high mechanical strength, the Nitrogen content shall not be less than 0.17% by mass.

8) Boilers with heat exchangers constructed of austenitic stainless steels, such as 316L or 304, and ferritic stainless steels, such as 439, are unacceptable.

9) Boilers with heat exchangers constructed of cast aluminum, mild steel, cast iron or copper finned tube materials are unacceptable.

3. Pressure Vessel: Design and construction shall be in accordance with Section IV of the ASME Code for heating boilers.

a. The shell shall be minimum**:** 0.3125" thick steel, SA-790 or SA-516 Grade 70.

b. The top head shall be a minimum 0.375" thick steel, SA-790 or SA-516 Grade 70.

c. The water side of the pressure vessel shall be a counter-flow design with internal water-baffling plates.

d. The boiler return and supply water connections shall be**:** 4" 150# ANSI flanged. The water connections shall not be designed to support an external structural load from the piping system.

e. The water volume of the boiler shall not be less than: 102 Gallons.

1) For boilers with a lower water volume, the boiler manufacturer shall provide a buffer tank and all associated buffer tank ancillaries to make equivalent to the total volume of the design basis.

f. The maximum water pressure drop across the boiler inlet and outlet connections, shall not exceed: 1.6 PSID at 200 GPM.

4. Fuel/Air Mixture Combustion System: Air and gas pre-mix on the suction side of the fan.

   a. A Flame-by-Wire™ or equivalent electronic combustion control system shall be provided to empower technicians to accurately dial-in positions electronically. The system shall feature O2 Compensation™ or equivalent to continuously tune the burner air-fuel ratio in real time, automatically adjusting for changes in seasonality to maximize combustion efficiency and condensate production for greater energy savings and reduced emissions. Pneumatic ("negative regulation", "zero governor") type systems offer far less precision and are not capable of independent air and gas control and are not accepted.

   b. The air and gas tolerance shall be no greater than +/- 0.2° to allow for much more precise control of air-fuel ratio compared to linkages that may slip, or pneumatic gas valves which drift over time and have difficulty handling environmental and installation fluctuations.

      1) Combustion air flow shall be controlled by fan speed and a servo-motor actuated butterfly valve. Fuel flow shall be controlled by a servo-motor actuated butterfly valve.

   c. PURE Control™ algorithms with open-loop instrumentation shall be used for autonomous fuel/air ratio tuning without requiring manual input. O_2 feedback or monitoring-only systems cannot adjust for operation variability and are not accepted.

5. Burner: Standard natural gas, forced draft.

   a. Burner Head: Shall be a woven fiber premix design.

   b. Excess Air: The burner shall operate at no greater than 8.0% excess O_2 over the entire turndown range. Due to significant reductions in combustion efficiency at high levels of excess O_2, boilers exceeding 8.0% excess O_2 at any operating condition shall not be accepted.

   c. Emissions: When operating on natural gas, the boiler shall maintain a NOx level of <20 ppm, and CO emissions less than 50 ppm, over the complete combustion range at a 3% O_2 correction.

6. Blower: Variable speed, non sparking, hardened aluminum impeller centrifugal fan to operate during each burner firing sequence and to pre-purge and post-purge the combustion chamber.

   a. Motor: Brushless DC variable speed motor with hall effect sensor feedback; internal electronic commutation controller with built in speed control and protection features; long life, sealed, ball bearing with high temperature grease.

   b. Variable speed blower: Closed loop PWM signal input with tachometer output.

7. Main Fuel Train:

   a. The boiler shall have a pre-mix combustion system, capable of operating at a minimum 4" W.C. incoming natural gas pressure while simultaneously achieving emissions performance, full modulation, and full rated input capacity. Maximum natural gas pressure allowed to the inlet of the fuel train shall be no less than 28" W.C.

b. A factory mounted main fuel train shall be supplied. The fuel train shall be fully assembled complete with high and low gas pressure switches, wired, and installed on the boiler and shall comply with CSD-1 code. The fuel train components shall be enclosed within the boiler cabinet.

c. Standard CSD-1 fuel train shall comply with AXA XL.

8. Ignition: Direct spark ignition with transformer.

9. Boiler Enclosure:

a. Sealed Cabinet: Jacketed steel enclosure with left hinged full height front access door, fully removable latching access panels, gasketed seams to maintain sealed combustion, mounted on a steel skid with steel plate decking.

b. Control Enclosure: NEMA 250, Type 1.

c. Finish: Internally and externally primed and painted or powder coated.

d. Combustion Air: Drawn from the inside of the sealed cabinet, preheating the combustion air.

10. Rigging and Placement: The boiler shall come with lifting eyes and fork hole accessibility for rigging.

11. Exhaust Manifold: Shall be constructed of stainless steel, with an area for the collection and disposal of flue gas condensate.

12. Characteristics and Capacities:

a. Heating Medium: Closed loop hot water with up to 50% propylene or ethylene glycol by volume. Standard capacities shall be based on 100% water.

b. Design Water Pressure Rating: 160 psig.

c. Safety Relief Valve Setting: 125 psig.

d. Minimum Return Water Temperature: No minimum temperature required.

e. Maximum Allowable Water Temperature: 210°F.

f. Minimum Water Flow Rate: No minimum flow rate required to protect the heat exchanger.

g. Maximum Water Flow Rate: No maximum flow rate requirement.

h. Minimum Delta-T: No minimum delta-T required.

i. Maximum Delta-T: 100°F

j. Minimum Side Clearance: Shall not exceed 1” between any number of boilers.

k. Maximum Allowable Operating Setpoint: 200°F

l. Jacket Losses: External convection and radiation heat losses to the boiler room from the boiler shall comply with IAW ASHRAE 103-2007, and shall not exceed 0.2% of the rated boiler input at maximum capacity.

13. The boiler shall have its efficiency witnessed and certified by an independent third party, and the efficiency must be listed on the AHRI directory (www.ahridirectory.org) for natural gas operation. The test parameters for efficiency certification shall be the BTS-2000 standard. The certified thermal efficiency for natural gas firing shall not be less than: 93.7%.

14. A zero flow or low flow condition shall not cause any harm to the pressure vessel or heat exchanger of the boiler. Flow switches, dedicated circulator pumps, or primary-secondary arrangements shall not be required to protect the boiler from thermal shock. Boilers requiring the use of flow switches or primary-secondary piping arrangements are unacceptable.

15. The dimensions of the boiler shall not be more than (Height x Width x Depth): 80” x 34” x 61”.

16. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer’s standard commercial product unless specified otherwise. Additional equipment features, details, accessories, etc. which are not specifically identified but which are a part of the manufacturer’s standard commercial product, shall be included in the equipment being furnished.

I. TRIM

1. Safety Relief Valve: ASME Rated.

2. Pressure and Temperature Gauge: Minimum 3-1/2” diameter, combination pressure and -temperature gauge. Gauges shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.

    a. Mounted in the field in the boiler supply water piping prior to the first isolation valve by the boiler installer.

3. Combustion Air Inlet Filter: 50 Micron.

4. Flue Gas Condensate Drain Trap: A flue gas condensate drain trap shall be provided to prevent positive pressure exhaust gases from entering the boiler room.

5. Flue Gas Condensate Neutralization: Provide and install manufacturer’s pH neutralization kit downstream of condensate drain trap.

J. CONTROLS

1. The boiler electrical controls shall include the following devices and features:

    a. 7” color touch screen control display factory mounted on the front cabinet panel door.

        1) The control display shall serve as a user interface for programming parameters, boiler control and monitoring; and shall feature a screen saver, alarm horn speaker, boiler status, configuration, history and diagnostics.

    b. Integral controls power supply.

    c. Flame safeguard control with 9 combustion fuel/air load profile points.

    d. All standard controls shall be factory mounted and wired according to UL requirements.

2. Burner Operating Controls: To maintain safe operating conditions, factory mounted and wired burner safety controls limit burner operation:

    a. High Limit: A manual reset mechanical Aquastat device shall stop the burner if operating conditions rise above maximum boiler design temperature.

    b. Low-Water Cut Off: Electronic probe type mounted in the pressure vessel shall prevent burner operation on low water alarm.

    c. Air Safety Switch: Prevent operation unless sufficient combustion air is proven.

    d. Blocked Exhaust: Prevent operation in the event of a blocked flue gas exhaust stack.

3. O_2 Compensation: To maximize efficiency throughout seasonality:

    a. System shall use algorithms to automatically adjust the fuel/air ratio during operation, optimizing combustion reliability, flame stability, combustion efficiency, and the dewpoint temperature for formation of flue gas condensate.

    b. O_2 monitoring-only type systems that cannot automatically adjust combustion for seasonal variability shall not be accepted. Systems that trim but at less than a 100% duty cycle are unable to cope with rapid changes in operating conditions and shall not be accepted.

4. Boiler Operating Controls and Features:

    a. Inlet Water Temperature Monitoring.

    b. Combustion Air Temperature Monitoring.

    c. Flue Gas Exhaust Temperature Monitoring: Sensor probe shall be stainless steel.

    d. Proportional Integral Derivative (PID) temperature load control capability for hydronic and domestic hot water in standalone or lead/lag operation.

    e. Operating temperature sensor for automatic start and stop.

        1) The temperature sensor shall have tolerance according to IEC 60751

    f. Time of day display.

    g. Customizable boiler name display.

    h. Two customizable boiler interlock terminals displayed.

    i. Alarm history for a minimum 100 most recent alarms including status at time of lockout.

    j. Administrative password protection options.

    k. Indirect domestic hot water priority.

l. Outdoor air temperature (OAT) reset controls with warm weather shutdown:

1) OAT reset shall automatically adjust the setpoint according to changes in the outdoor temperature, and disable the boilers above a warm weather shutdown temperature.

2) The boiler manufacturer shall provide an OAT sensor.

3) The temperature sensor shall be field installed in an outdoor area not exposed to direct sunlight or the exhaust of other mechanical equipment, and wired the boiler controller.

4) The control shall be field programmed with the outdoor reset schedule.

m. Variable Speed System (Secondary) Pump Control:

1) When installed in a variable primary flow configuration, the boiler controller shall provide the capability to control two variable speed hydronic heating pumps. One pump shall be duty, and one standby.

2) The duty system pump shall be enabled upon the outdoor air temperature dropping below the warm weather shutdown temperature. Pumps shall be automatically rotated.

3) Variable speed signal shall be provided to modulate pump speed according to hydronic heating loop Delta-T. A user selectable parameter allows for Delta-P in place of Delta-T.

n. Motorized isolation valve control:

1) Upon heat demand for the boiler, the control shall provide an enable/open signal.

2) After the burner is disabled and upon the heat exchanger delta-T dropping to a user programmable delta-T, the signal will be disabled.

a) Boilers which utilize only a time delay close as the only means of valve actuation are unable to optimize for residual heat, and will not be accepted.

3) In variable primary arrangements, the control shall hold the lead boiler isolation valve open at all times.

5. Building Automation System Interface: Hardware and software to enable building automation system (BAS) to monitor, control, and display boiler status and alarms.

a. Hardwired Contacts:

1) Monitoring: Boiler Status, Burner Demand, General Alarm.

2) Control with Factory Installed Jumper: Safety Interlock for External Device, Remote Enable, Emergency Stop (E-Stop).

3) Remote Setpoint Signal: 4-20 mA or 0-10 VDC.

b. Communication Protocol: A communication interface with BAS shall enable BAS operator to remotely enable and monitor the boiler plant from an operator workstation.

1) The boilers will communicate with each other and the Building Automation System via a daisy chain addressed Modbus network. Field wiring between nodes shall be twisted pair low voltage with shielded ground.

2) A BACnet MSTP and IP protocol communication gateway shall be provided. The BACnet gateway is field installed on a boiler. Additional boilers in the lead/lag system shall not require a dedicated BACnet gateway for the BAS to monitor status. A communication point mapping list shall be provided.

3) A LonWorks protocol communication gateway shall be provided. The LonWorks gateway is field installed on a boiler. Additional boilers in the lead/lag system shall not require a dedicated LonWorks gateway for the BAS to monitor status. A communication point mapping list shall be provided.

K. ELECTRICAL POWER

1. Single-Point Field Power Connection: Factory-installed and factory-wired switches, transformers, control and safety devices and other devices shall provide a single-point field power connection to the boiler.

2. Electrical Characteristics:

a. Voltage: 120 V.

b. Phase: Single.

c. Frequency: 60 Hz.

L. VENTING

1. The boiler shall be capable of operating with a stack effect not exceeding -0.04” W.C. and a combined air intake and exhaust venting pressure drop not exceeding +1.50” W.C.

2. Combustion Air Intake: Direct vent the boiler using sealed combustion by drawing combustion air in from the outdoors.

a. Sealed Combustion: Schedule 40 PVC pipe or smooth-walled galvanized steel, vent termination with 1/2” x 1/2” mesh bird screen.

3. Flue Gas Exhaust: The flue gas exhaust stack shall be AL 29-4C or 316L stainless steel, listed and labeled to UL-1738 / C-UL S636 for use with Category II/IV appliances, guaranteed appropriate for the application by the manufacturer and supplier of the venting.

4. Common Exhaust Vents: The draft system shall be designed for Category II and to prevent the backflow of exhaust gases through idle boilers.

5. Condensate drain piping must be galvanized, stainless steel, or Schedule 40 CPVC. Copper, carbon steel, or PVC pipe materials are not accepted.

M. SOURCE QUALITY CONTROL

1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

2. Each boiler shall be installed and operated in a functioning hydronic system, inclusive of venting, as part of the manufacturing process. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

N. EXAMINATION

1. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.

    a. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

2. Examine mechanical spaces for suitable conditions where boilers will be installed.

3. Proceed with installation only after satisfactory conditions have been verified.

O. BOILER INSTALLATION

1. Install boilers level on concrete pad, minimum 4 inches high.

2. Install gas-fired boilers according to NFPA 54. Equipment and materials shall be installed in an approved manner and in accordance with the boiler manufacturer’s installation requirements.

3. Assemble and install boiler trim.

4. Install electrical devices furnished with the boiler but not specified to be factory mounted.

5. Install control wiring to field-mounted electrical devices.

P. CONNECTIONS

1. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

2. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

3. Connect gas piping to boiler gas train inlet with isolation valve and union. Piping shall be at least full size of gas train connection. Provide a reducer if required.

4. Connect hot water supply and return water connections with shutoff valve and union or flange at each connection.

5. Install piping from safety relief valves to the nearest floor drain.

6. Install piping from flue gas condensate drain connection to the condensate drain trap and to the nearest floor drain.

7. Boiler Venting:

   a. Install flue venting and combustion air-intake.

   b. Connect to boiler connections, flue size and type as recommended by the manufacturer.

8. Ground equipment according to Division 26 Section “Grounding and Bonding for Electrical Systems.”

9. Connect wiring according to Division 26 Section “Low-Voltage Electrical Power Conductors and Cables.”

Q. FIELD QUALITY CONTROL

1. Perform tests and inspections and prepare test reports.

   a. After boiler installation is completed, the manufacturer shall provide the services of a field representative to inspect components, assemblies, and equipment installations, including connections and provide startup of the boiler and training to the operator.

   b. Arrange with National Board of Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

2. Tests and inspections:

   a. Perform installation and startup checks according to manufacturer’s written instructions.

   b. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

   c. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

      1) Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.

      2) Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3. Remove and replace malfunctioning units and retest as specified above.

4. Occupancy Adjustments: When requested within 12 months of startup, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to 2 visits to Project during other than normal occupancy hours for this purpose.

2.3 CONDENSING BOILER VENTS:

A. This section includes specifications for furnishing and installing Non-Positive and Positive Pressure Vent systems for Condensing and Non-Condensing applications.

B. SUBMITTALS

1. Submit the following in accordance with this section.

   a. Product Catalogs
   b. Installation Drawings
   c. Material List
   d. Installation Manual

C. QUALITY ASSURANCE

1. STANDARDS

   a. Where applicable, products furnished under this section shall conform to the requirements of NFPA 54 and NFPA 211, and shall comply with UL 1738, ULC S636 Standard for Venting Systems for Category II, III, and IV Gas-Burning Appliances, and all other applicable standards. Also approved for use with Type L Venting systems (gas or oil) in accordance with UL 641.

   b. All flue-gas carrying components of the vent system shall be obtained through one source.

   c. Vent shall be warranted by the manufacturer against defects in material and workmanship for a period of (15) years from the date of manufacture.

D. PRODUCTS

1. Vent shall be factory-built special gas type, double wall, engineered and designed for use on Category I, II, III, and IV appliances, or as specified by the equipment manufacturer.

2. Maximum continuous flue gas temperature not to exceed 550°F (288°C) for gas burning appliances. Maximum temperature for appliances approved to vent with Type L-Vent (gas or oil) is 570°F (299°C).

3. Vent shall be constructed with an inner conduit constructed of AL29-4C® or 29-4 (S44735) superferritic stainless steel with a minimum thickness of .015" for diameters 3"-8", .020" for diameters 10"-16", .025" for diameters 18"-24", and .035" for 26" and greater.

4. Vent shall be listed for an internal static pressure of 15" w.g. and tested to 37" w.g.

5. All inner wall conduit components shall be manufactured from AL29-4C® or 29-4 (S44735). The joint closure system shall be an Inner Wall Mechanical Locking Strap design. Joints shall not use screws or fasteners that penetrate the inner conduit.

6. Vent shall be constructed with a factory installed gasket used to seal the joint for diameters 4"–16". Use of gasket lube, available from the factory, should be used for maximizing gasket life and ease of installation. For diameters 18"- 32", joints shall be sealed with factory supplied RTV sealant.

7. Inner wall joints shall be designed with a male and female overlapping metal-metal connection to maintain condensate on the AL29-4C stainless steel. Proper ¼" per foot pitch must be maintained at all times and condensate should flow back toward the appliance to the required number of drains.

8. The outer wall casing shall be constructed of 430 stainless steel that shall not require additional surface preparation, such as painting, in order to withstand the outdoors or high humidity environments.

9. Inner conduit and outer wall casing shall be constructed with a one-inch air space between them and in such a fashion that prevents cross-alloy contamination. Optional 1" fiber insulation is available to maintain higher flue temperatures, but does not reduce clearances beyond the standard clearances tested for 1" airspace model CI Plus.

10. Tees and elbows shall provide a pressure drop less than 15 feet equivalent horizontal vent.

11. Fittings that increase or decrease vent diameter shall be asymmetric in construction with a flat wall that maintains a straight line with adjoining parts in order to facilitate the unobstructed flow of all condensate.

12. All parts shall be compatible with other single wall and double wall products of the same manufacturer.

13. System shall be sized in accordance with the appliance manufacturer's specifications, NFPA 54-National Fuel Gas Code (ANSI Z223.1), ASHRAE recommendations, and other applicable codes.

E. SEALANT

1. General Electric RTV106 (aka Momentive) or Dow Corning 736 High Temperature Sealant shall be used to seal all joints on systems where the maximum flue gas temperature will not exceed 550°F.

   OR

2. A factory installed 550°F compatible silicone rubber gasket shall be used to seal joints.

F. EXECUTION

1. Illustrated installation manuals shall be supplied to the installer and shall be available for downloading from the manufacturer's website.

2. All components shall be installed in strict compliance with the manufacturer's instructions and all pertinent local, regional, national, and international building and mechanical codes and regulations.

3. Equip vents with expansion provisions and with roof support assembly including ventilated thimble, cone roof flashing, storm collar, and guy ring. Terminate with storm collar or stack cap as recommended by boiler manufacturer. Horizontal vent runs must allow for flue gas condensate to drain back with a minimum upward pitch of 1/4" per foot run. There must be no low spots in the exhaust vent, as this can result in a condensate pocket.

4. All venting shall be in strict accordance with boiler manufacturer's installation guidelines, instructions, and recommendations.

5. Roof Termination: The minimum vent height shall extend at least 3 feet above the roof surface, or at least 2 feet above the highest part of any structure within 10 feet of the vent. When installing inlet and exhaust terminations above the roof, the exhaust outlet must be installed 4 feet minimum above and 4 feet minimum downwind from air supply inlet to prevent exhaust recirculation. Greater separation is strongly recommended. Equip vents with expansion provisions and with roof support assembly including ventilated thimble, cone roof flashing, storm collar, vent cap and guy ring. Guy stacks using (1-1/2") standard weight galvanized steel pipe.

6. Side Wall Termination: When penetrating a non-combustible wall, the hole through the wall must be large enough to maintain the pitch of the vent and provide sealing. Use adhesive material to seal around the vent on both sides of the wall. When penetrating a combustible wall, a wall thimble must be used. The termination of the vent system must be at least 12 inches above the finished grade, or at least 12 inches above normal snow accumulation level (for applicable geographical areas).

    a. The termination of the vent system shall not be located over traffic areas such as public walkways, or over an area where condensate or vapor could create a nuisance or hazard. Do not terminate below operable windows and building openings unless an exception is granted by the authority having jurisdiction. The vent terminations must be at least 4 ft (1.22 m) horizontally from electric meters, gas meters, regulators, and relief equipment. When installing combustion air intake and exhaust terminations on the same wall, the exhaust outlet must be installed 4 feet minimum above and 10 feet minimum downwind from combustion air inlet to prevent flue gas recirculation. Greater separation is strongly recommended.

    b. Flue should be directed away from surfaces, if possible. The flue gas vent termination must be a vertically oriented tee, or as required by the boiler manufacturer. A 45° elbow termination is not permitted.

7. Condensing Boiler Vents shall be Heatfab Saf-T Vent® CI Plus or pre-approved equivalent.

2.4 AIR COOLED CONDENSING UNITS:

A. Include a scroll compressor, condenser and condenser fan, all enclosed in a single casing. Provide separate refrigerant circuit for each compressor.

B. Casings: aluminum or galvanized steel designed for outdoor installation. (Galvanized steel casings shall be finished with enamel over bonderizing.) Equip casings with access panels, condenser inlet guards and fan outlet guards. Provide padlock connections for power and control access panels.

C. Compressors: welded hermetic compressors, spring isolated, with reversible oil pumps. Refrigerant: R454B or R32.

D. Condensers: aluminum fins securely bonded to seamless copper tubes. Condenser fans: direct driven propeller fans, resiliently mounted, with weather protected fan motors.

E. Controls: factory wired and located in a readily accessible location. Provide (2 step) line voltage contactor and both temperature and current sensitive overload devices and phase loss protection for compressor motor, cycle timer to limit compressor starts to 5 or 6 minute intervals, oil pressure switch, high and low pressure switches and crankcase heater.

F. Mount condensing units on poured in place pad.

G. Provide 5 year non-prorated compressor parts warranty.

2.5 HEAT PUMP OUTDOOR UNIT

A. Outdoor unit: a single scroll compressor, heat transfer coil, fans, and inter-connecting piping and controls all enclosed in a single casing. For multiple compressor units provide separate refrigerant circuits.

B. Casings: designed for outdoor installation, constructed of not lighter than (20) gauge galvanized steel with baked enamel finish over bonderizing. Provide access panels, condenser inlet guards and fan outlet guards.

C. Compressors: Welded hermetic, spring isolated, with reversible oil pumps. Refrigerant: R-454B or R32.

D. Coils: aluminum fins securely bonded to seamless copper tubes. Fans: direct driven propeller fans with weather protection for fan motors.

E. Provide suction and discharge service valves, liquid stop valve, and solenoid change-over valves.

F. Controls: factory wired and located in a readily accessible location. Compressor motor shall have line voltage (multi-step) contactor and both temperature and current sensitive overload devices. Include high and low pressure switches, short cycle timer, crank case heater, defrost thermostat, and defrost timer.

G. Mount outdoor units on poured in place pad

H. Provide 5 year non-pro-rated compressor parts warranty.

I. Heat pumps shall be: Trane or Carrier.

2.6 ELECTRIC PIPE LINE HEATERS:

A. Electric heaters equal to "Auto-Trace" or Chromolox "Self-Regulating Freeze Protection" heating cable, wattage as required to prevent freezing in 0°F ambient, equipped with conduit connectors and outdoor thermostat set at 32°F.

B. Extent:

1. All chilled water piping outdoors above grade subject to temperatures below 32F.

C. Installation: Minimum installation requirements are based on 1-1/2” thick cellular glass insulation over electric pipe line heaters and self-regulating low temperature cable. Provide 1 or 2 straight runs of pipe line heaters as indicated at the heat output noted. Follow manufacturer’s recommendations for installation.

Nominal Pipe Size	Electric Heater Output (w/Ft.)	Number Of Straight Runs of Pipe Line Heater Per Pipe
2” and under	3.0	1
2-1/2”	3.0	1
3”	3.0	1
4”	5.0	1
6”	8.0	1
8”	8.0	1

10”	8.0	1
12”	8.0	1
14”	8.0	1
16”	5.0	2
18”	5.0	2
20”	8.0	2
22”	8.0	2
24”	8.0	2
Over 24” Construction Manual		

2.7 AIR COOLED WATER CHILLER UNITS:

A. Include multiple microprocessor controlled scroll compressors, condenser and condenser fan and liquid cooler, all enclosed in a single casing. Provide a separate refrigerant circuit for each compressor. Chiller shall have power wiring arranged for a dual power feed to unit. Refrigerant: R-454B or R-32. Chillers shall be certified in accordance with the latest Standard AHRI 550/590. Chillers shall have a minimum NPLV of 15.7 EER.

B. Cabinet: heavy gauge aluminum or galvanized steel for outdoor installation. (Galvanized steel casings shall be finished with enamel over bonderizing.) Equip cabinets with access panels, condenser inlet guards and fan outlet guards. Provide padlock connections for power and control panels.

C. Compressors: hermetic scroll-type compressors, including the following:

1. Complaint design for axial and radial sealing.

2. Refrigerant flow through the compressor with 100% suction cooled motor.

3. Large suction side free volume and oil sump to provide liquid handling capability.

4. Compressor crankcase heaters to provide extra liquid migration protection.

5. Annular discharge check valve and reverse vent assembly to provide low-pressure drop, silent shutdown and reverse rotation protection.

6. Initial oil charge.

7. Oil level sightglass.

8. Vibration isolator mounts for compressors.

9. Brazed-type connections for fully hermetic refrigerant circuits.

10. Compressor motor overloads capable of monitoring compressor motor current.

11. Factory-mounted compressor acoustic sound blankets.

D. Condenser coils: all-aluminum microchannel coils.

E. Condenser fans: dynamically and statically balanced, direct drive, corrosion resistant glass fiber reinforced composite blades molded into a low noise, full airfoil cross section, providing vertical air discharge and low sound. Each fan in its own compartment.

F. Vibration Isolation: Provide seismic deflection rated vibration isolators sized for operational weight of chillers.

G. Fan Motors: High efficiency, direct drive, rigid mounted, with double sealed, permanently lubricated, ball bearings.

H. Water chiller: shell and tube or shell and coil direct expansion chiller (with a separate refrigerant circuit for each compressor), shell baffles to provide capacity shown, drain connection, 1-1/2" thick evaporator foamed plastic insulation. Paint all foamed plastic insulation with two (2) coats of manufacturer approved weather resistant paint.

I. Interconnecting refrigerant piping: Type L hard copper, wrought copper sweat fittings silfossed, foamed plastic insulation.

J. Provide (liquid receiver if condenser coil will not contain entire system charge where 80% full at 100°F) suction and discharge service valves and liquid stop valve.

K. Controls: factory wired, located in a readily accessible rain and dust tight control cabinet with provision for padlocking.

1. Compressor motor controls: line voltage contactors and both temperature and current sensitive overload devices, cycle timer to limit compressor starts to 5 or 6 minute intervals, oil pressure switch, high and low pressure switches and crank case heater.

2. Chiller controls: solenoid liquid valve for each circuit, operating thermostat to cycle solenoids valves, and low limit chilled water thermostat.

3. Provide automatic reset upon power loss.

L. Chillers shall have a minimum 14,000 amps interrupting capacity (AIC) rating.

M. The chiller warranty shall include the entire chiller and shall be for 5 years from start-up date. During the warranty period the manufacturer shall furnish all **parts** and **labor** required for any warranty failure. The warranty shall include any expenses required for travel, lodging, meals, etc. for the technician performing the work or any freight costs for replacement parts.

N. The installation, pressure testing, evacuation, dehydration, charging and initial startup, final assembly and alignment of all refrigeration equipment shall be done under the supervision of the manufacturer's factory trained representative. Include services of a factory trained technician for instructing Owner's operating personnel in machine operation: One (1), Eight (8) hour day. Training shall be scheduled and coordinated with the Owner a minimum of two (2) weeks prior to date of training. Review of factory start-up reports along with operation and maintenance (O&M) manuals shall be included in Owner training.

O. Provide a minimum of three (3) sets of hard copies and two (2) CD's with PDF files with manufacturer's operating and maintenance (O&M) manuals and parts lists for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency thereof. Include all warranty dates on equipment and guarantees. Refer to O&M requirements.

P. Verification of Capacity and Efficiency: Chiller shall be run-tested at the manufacturer's plant or laboratory, to check performance (tons and KW), vibration, operating controls, safety cutouts and to confirm reliable operation with no oil loss. The manufacturer shall provide to the Owner a certified test report to confirm that the chiller performs as specified before final payment. Attach a sample test report with the proposal to insure conformance with AHRI 550/590. Each proposal must include a factory sample test report. The performance test shall be run in accordance with AHRI 550/590. The procedures and instrumentation listed below conforms to AHRI 550/590. The guidelines must be followed to insure the accuracy of this performance test.

Q. The equipment will be accepted if the test procedures and results are in conformance with AHRI Standard 550/590. If the equipment fails to perform within allowable tolerances, the manufacturer will be allowed to make necessary revisions to his equipment and retest as required. In the event that these revisions do not achieve submitted performance the following penalties will be imposed. If such test revisions are required or the testing is delayed and the travel time is extended at the fault of the manufacturer, the manufacturer will be responsible for all incidental costs associated with such delays (hotel, meals, flight change fees, etc.)

1. Capacity Test: For each ton below AHRI 550/590 tolerance; five hundred dollars per ton will be assessed to the chiller manufacturer or deducted from the contract price.

2. Power Consumption Test: The power consumption penalty shall be based on the tolerances set forth in AHRI Standard 550/590. The power consumption penalty (P.C.P.) will be calculated based upon the following formula:

P.C.P. = [Measured KW - (scheduled KW)] x $1000/KW

R. Mount chiller on concrete pad.

S. Provide differential pressure switch with chiller.

T. Provide full integrated BAS connectivity via BACnet® MS/TP. Coordinate requirements with Andover Controls vendor prior to order being placed. See controls sequences on drawings for capabilities. BAS shall have capability of load limiting chiller.

U. Provide 5 year non-prorated compressor parts and labor warranty as part of the chiller warranty.

V. Chillers shall be Trane or Carrier.

2.8 VARIABLE FREQUENCY SPEED CONTROLLERS:

A. For each motor so scheduled provide a variable frequency, AC, solid state, induction motor speed controller. The speed controller shall be self-contained, with all components enclosed in a NEMA 1 cabinet and be capable of operation 1-40 degrees centigrade. The controller shall be capable in operating with ± 10% of system voltage and 60 Hz ± 3% frequency variation. It shall have 10-1 frequency range. The speed controller shall be wall or floor mounted.

B. The speed controller shall be automatically controlled by a pneumatic 3-15 psi signal, 10 volt dc, 4-20 milliamps, control signal. 20 milliamps shall correspond to maximum speed and 4 milliamps shall correspond minimum speed. The controller shall have capability to invert the input signal, if necessary due to process requirements. Coordinate control signal with controls contractor.

C. The VFD's shall limit harmonic distortion reflected onto the utility system to a voltage and current level as defined by IEEE 519 for general systems applications, by utilizing the standard 3% nominal impedance integral ac three-phase line reactor. An isolation transformer or external line reactor may be substituted as an option. Provide line reactor on the output of the drive to limit standing wave and to prevent damage to the VFD and motor. **All VFD's for motors 100 HP or more shall be Active Front End (AFE) utilizing insulated gate bipolar transistors (IGBTs) instead of diodes in the rectifier circuit. Active Front End (AFE) drives shall limit total harmonic distortion to 3%.**

D. Total harmonic distortion shall be calculated under worst case conditions in accordance with the procedure outlined in IEEE Standard 519-1992. Copies of these calculations shall be provided in the submittal. The contractor shall provide any needed information to the VFD supplier three (3) weeks prior to submittal date.

E. If the system cannot meet the IEEE 519-1992 harmonic levels with VFD's provided with the standard input line reactor or optional input isolation transformer, the VFD manufacturer shall supply a twelve pulse, multiple bridge rectifier ac to dc conversion section with a phase shifting transformer.

F. The speed controller shall be completely prewired at the factory and shall have one input power connection and one output power connection to the motor. If isolation transformer, line filters, or other equipment is required external to the speed controller cabinet, then all interconnecting wiring shall be provided at no extra cost to the Owner. See Electrical single line wiring diagram for input wire size and lug size required.

G. Sound power developed by speed controllers shall not numerically exceed NC-75 sound pressure and by motors shall not exceed 4 dB(A) above specific motor across the line delivered sound pressure levels in 2nd through 8th octave bands.

H. VFD programmable parameters shall be adjustable from the keypad. The display shall be alphanumeric, programmable with status indicators. The display shall be in plain English words for parameters, status and diagnostic messages. Alphanumeric codes and/or tables are unacceptable.

I. Standard advanced programming and trouble-shooting functions shall be available by using a personal computer's RS-232 port or RS-485 port and Windows™ based software. In addition, the software shall permit control and monitoring via the VFD's RS-232 port or RS-485 port. VFD manufacturer may offer a BAS serial link and field bus adapter for standard protocols.

J. Provide two (2) programmable Form C contact outputs (one for motor running and one for fault trip) and one (1) programmable 24VDC open collector output (for drive ready).

K. Provide six (6) digital inputs for start/stop, local/remote, external interlock, two preset speeds and run enable.

L. The drive shall record and log faults. The VFD shall display all faults in plain English.

M. The variable frequency drive(s) and all components shall be designed, manufactured and tested and approved in accordance with the latest applicable ANSI, IEC, UL, CUL, CSA and NEMA standards. Each drive shall be rated to withstand a minimum of 65,000 amps fault current. (Verify available fault current with electrical.)

N. The supplier of the drive assembly shall be the manufacturer of the electromechanical power components used within the assembly, such as bypass contactors, circuit breaker, fused disconnect switch devices when specified.

O. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

P. The VFD's shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation. Adjustable Current Source VFD's are not acceptable. Insulated Gate Bipolar Transistors (IGBT's) shall be used in the inverter section. Bipolar Junction Transistors, GTO's or SCR's are not acceptable.

Q. The VFD's shall be capable of operating any NEMA Design B squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the VFD. VFD carrier frequency shall be limited to 3-8 kHz for optimum motor performance.

R. The VFD's shall be able to start into a spinning motor. The VFD's shall be able to determine the motor speed in any direction and resume operation without tripping. If the motor is spinning in the reverse direction, the VFD's shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the preset speed.

S. The speed controller shall incorporate the following minimum features:

1. Door interlocked circuit breaker or disconnect switch with input fuses capable of being locking in off/open position.

2. All control inputs isolated from ground and power.

3. Hand-off-automatic selector (on face of panel).

4. Ground fault protection, over current, over voltage, under voltage, over temperature, loss of speed reference, and UL 5086 motor overload protection.

5. Pilot light indication for VFD and bypass modes (on face of panel).

6. Individual acceleration/deceleration adjustments.

7. Maximum and minimum speed adjustments.

8. 120V AC control power transformer for low voltage control that can easily interface with building safe interlock circuits.

9. Solid State microprocessor based logic for starting and stopping motors.

10. One analog output signal for output frequency.

11. Insensitivity to incoming phase rotation.

12. Auto reset with coast down timer with 0.05 second dropout (after power or thermal shutdown).

13. Output current limiters.

14. Motor stall protection.

15. Manufacturer's warranty of 2 years from date of start-up.

16. Output isolation contactor.

17. Bypass contactor mechanically and electrically interlocked with the output isolation contactor.

18. Overload relays for bypass contactor.

T. Provide factory check-out and start-up service.

U. Speed controllers shall be suitable for use with current shown on the Electrical drawings.

V. Speed controllers shall be ABB ACH-580, Danfoss, Reliance, Square D, Cutler-Hammer.

2.9 LINE MOUNTED PUMPS:

A. Line mounted pumps: 1750 rpm spring coupled pumps with iron bodies, bronze trim, stainless steel shafts, sleeve bearings, mechanical seals, resiliently mounted motors and gauge tappings in pump flanges.

B. Pumps shall be Armstrong, Aurora, Bell & Gossett, Patterson or Taco.

2.10 BASE MOUNTED PUMPS:

A. Base mounted pumps: enclosed impeller design, arranged to permit removing impeller without dismantling piping. Motors: 1800 rpm, drip proof, high efficiency (see Motors). Provide casings designed for pressure shown, but not less than 175 psig at suction. Provide motors sized to prevent overload at zero head horse power with impeller furnished.

B. Shafts: turned from heat treated carbon steel, key seat for the impeller, threaded for shaft nuts, finish turned over entire surface.

C. Shaft Sleeves: Equip portions of the shafts coming in contact with the water with removable bronze or stainless steel sleeves.

D. Impeller: bronze with machined finish on the outside and smooth surfaces inside, balanced to prevent vibration. Impeller diameters shall not exceed 85% of maximum diameter for volute.

E. Casing wearing rings: bronze, easily replaced, installed to prevent rotation.

F. Equip pumps with mechanical seals suitable for use with design water temperatures. Provide 1 spare shaft seal of each size used on job.

G. Bearings: ball grease lubricated type of ample size to insure cool running without the necessity of water cooling, effectively sealed against the entrance of water, dust or dirt and leakage of grease.

H. Couple motor to pump with flexible coupling equal to Dodge "Paraflex".

I. Mount motor and pump on common rigid steel or cast iron base and grout pump base per manufacturer's recommendations.

J. Pumps shall be Armstrong, Aurora, Bell & Gossett, Patterson or Taco.

K. Align pump and motor in accordance with manufacturer's instructions. Check alignment after first 8 hours operation.

2.11 STANDARD HORIZONTAL AIR HANDLING UNITS:

A. Horizontal air handling units: factory fabricated units having capacity shown, consisting in general of a mixing box section, a filter section, a preheat coil section, an access section, a cooling coil section, drip pan and drain sections, and supply and return fan sections, all the product of a single manufacturer. Provide all sections of the same frame size with support rails for all sections. Mount units on ribbed neoprene pads on concrete curbs as shown.

B. Casing: not lighter than 18 gauge galvanized steel, all sections of casing insulated with 2" thick 3 lb./cu.ft. coated fiberglass insulation. All sections shall be of double wall construction with solid 26 gauge galvanized steel liner on air side of all sections except coil section, which shall be solid.

C. Drain pans: double construction with insulation between pans and 16 gauge type 304 stainless steel inner pan.

D. Coil sections shall be double wall solid construction with the coils scheduled. Coils shall comply with the requirements below for coils.

E. Provide spacer sections for installing control bulbs between pre-heat and cooling coils. At least 18" space must be provided between preheat and chilled water coils.

F. Provide hinged and latched access doors in casings at fan sections, filter sections, plenum sections, upstream and downstream from cooling coils and elsewhere as shown and/or required for access to equipment and/or controls. Construct doors with 1-1/2" insulation between 2 sheets 24-gauge galvanized steel. Set doors in frames arranged so that doors will be flush with exterior of casing. Equip each door with at least 2 hinges and 2 sets of double acting latches. Latches shall be made from nonferrous metal, with a lever handle on the outside and a lever handle on the inside of the casing. Lever handle on the outside of the casing shall cam over a door pull with a stop. Doors shall be reinforced to prevent wracking and warping. Provide 3" butt hinges and weld to doors and to door frames. Provide galvanized steel nosings on casing insulation at doors. All pressurized access doors shall open into the fan section. Install gaskets at all section connections.

G. Automatic dampers shall comply with the requirements for automatic dampers below.

H. Air filters: see equipment schedule and "Air Filters". Provide side access filter sections, complying with the requirements under "Air Filters".

I. Provide vapor proof marine lights in all sections. Lights shall be factory wired with switches located next to access door. Wiring to be in compliance with NEC and Division 26.

J. Smoke dampers shall comply with the requirements for smoke dampers below.

K. Fans: plug fan forward curved or backward curved blade centrifugal fans, complying with the requirements for "Centrifugal Fans, General" statically and dynamically balanced to a peak vibration velocity of 0.157 inch/second, with corrosion resistant coating. Bearings shall be minimum ***L_{10} 200,000*** hour self-aligning grease lubricated ball bearings. Grease fittings shall be extended to accessible locations after units are installed. Fan and fan motor shall be mounted on spring isolated base inside unit, and snubbing isolators shall be provided for discharge flexible connections. Isolators shall comply with the requirements for Vibration Isolators (Section Materials & Methods, HVAC). Fan motor shall be mounted on an adjustable base and shall be equipped with V-belt drive sized for 150% motor nameplate rating, adjustable pitch motor pulley for motors 25 H.P. and smaller. For plug fan section access doors provide time delay door switches, chains and screened wheel guards.

L. At Contractor's option, fan sections only may be constructed as specified below for apparatus casings (Section "Air Distribution"). Casing size shall be of same size as adjacent coil section, but width of casing shall be increased if required to provide total casing width of one fan outlet width plus two wheel diameters. Casing length shall be sufficient to provide 6" minimum flexible connection on fan outlet plus 70% of fan outlet width between rear of fan scroll and upstream coil or damper. Equip each fan section with a 30" x 40" hinged and latched access door and marine light. Fans shall be DIDW, ARR#3 with air foil or BI wheels, inlet vanes and motor location and rotation as required to provide access to motor and drive. Fan and motor shall be installed on a common spring isolated base, and motor shall be equipped with slide rails with jack screw. Vibration isolators shall comply with the requirements for "Vibration Isolators" and snubbing isolators shall be provided for the discharge flexible connection.

M. AC units shall be Carrier, or Trane.

2.12 HEAT PUMP INDOOR UNITS:

A. Indoor units: supply fans, coils, filters, and drip pans, horizontal or vertical as shown.

B. Casings: galvanized steel not lighter than (22) gauge, reinforced with angles or formed shapes with baked enamel finish over bonderizing. Casing panels: removable for access to fans, motors, coils, and bearings. Provide knockouts for piping and electrical connections. Casing shall be insulated with 1" thick foil-faced duct liner meeting the requirements of NFPA 90A.

C. Provide statically and dynamically balanced direct driven centrifugal fans with self aligning ball bearings, adjustable speed motor (3 speed), and adjustable motor base.

D. Coils: include refrigerant coils and electric heating coils. Refrigerant coils shall consist of nonferrous fins securely bonded to seamless copper tubes, and shall bear AHRI approved ratings.

E. Drain pans: provide corrosion resistant coating and insulating corrosion-resistant fill.

F. Filters: 1" thick throwaway filters. Turn equipment over to Owner with clean filters.

G. Electric Heaters:

1. All heaters shall be listed in the Underwriters Laboratories, Inc. Electrical Appliance & Utilization Equipment list.

2. Heaters shall have ceramic supported nichrome wire elements, flanged mounting plate, NEMA 1 control box containing contactors for heaters, factory wired to terminal strips and 1/2" insulation between mounting plate and control box. All sheet metal parts in air stream aluminized or galvanized steel. Provide spaces at terminal end of heater so that internal duct insulation will not cause hot spots.

3. Equip heaters with factory wired automatic high limit control and a supplementary independent thermal device to disconnect all power circuits in case automatic high limit fails. Equip heaters shall be supplied with control circuits suitable for 24 volt control, factory wired to terminal blocks in control box.

4. Provide staging as required by code, but not fewer stages than those shown.

H. Indoor Units: of same manufacturer as outdoor units.

I. Provide insulated plenum bases as shown.

2.13 SPLIT SYSTEM AIR CONDITIONERS - SMALL:

A. Split system air conditioners shall consist of a wall mounted indoor section, outdoor condensing unit, connecting refrigerant piping, and electronic controls. System shall be UL rated.

B. Indoor unit shall consist of centrifugal evaporator fan(s), evaporator coil, drain pan with condensate pump and safety switch, all enclosed in a plastic casing equipped with adjustable supply grille and return air grille. Provide 3 pole disconnect switch.

C. Outdoor unit shall consist of compressor, condenser coil, condenser fan, and controls, all enclosed in a metal grilled cabinet suitable for roof or pad mounting. Provide refrigerant piping kit, pre-insulated, properly sized for capacity shown. (See drawings to determine length.) Provide low ambient operation to 20°Fdb outdoors.

D. Controls shall consist of a wall mounted remote controller utilizing a microprocessor. Functions shall include:

1. Computerized dehumidification.

2. Operation mode setting.

3. Self-diagnostic display.

4. Room temperature display.

5. Twenty-four hour on-off timer.

6. Fan speed indicator.

7. Memory.

8. Low ambient operation.

E. Split system air conditioners shall be Trane-Mitsubishi, Carrier, Daikin, Gree or approved equal.

2.14 COILS

A. Rated in accordance with ARI Standard 410-72 with capacities and dimensions shown.

B. Provide coils (other than sprayed coils) with aluminum fins and seamless copper tubes.

C. Sprayed coils shall have copper fins and seamless copper tubes. Solder coat fins and tubes.

D. Headers may be iron castings or steel or copper tubing. Braze return bends.

E. Space fins not closer than 10 per inch except that fin spacing may be decreased to maintain maximum coil depth of 8 rows (minimum 4 row coil depth).

F. All steam coils: steam distributing tube coils (non-freeze coils). Feed coils having tube lengths greater than 8 feet from both ends.

G. Circuit water coils to maintain pressure drops shown.

H. Prove coils tight with 200 psig under water air test.

I. Coil casings: 16 gauge stainless steel with flanges drilled for mounting.

J. Coils: Trane, or Carrier.

2.15 COILS (IN CASING FOR USE WITH FURNACE):

A. Coils shall be ARI rated encased coils and shall have capacities shown with maximum face velocity of 500 fpm.

B. Coils shall have aluminum fins and seamless tubes.

C. Coils shall be proved tight with 200 psig under water air test.

D. Coil casings shall be galvanized steel with internal fiberglass insulation and corrosion resistant drain pans. Casing panels shall be removable for access to coil and drain pan.

E. Coils shall be Carrier, or Trane.

2.16 CENTRIFUGAL ROOF EXHAUSTERS:

A. Centrifugal power roof ventilators with AMCA certified air and sound ratings, belt or direct driven as shown. Provide permanently oiled bearings, statically and dynamically balanced backward curved blade wheels and spun aluminum housing with curb cap, disconnect switches, back-draft damper and outlet bird screen. For belt driven fans provide V-belt drive sized for 50% overload, adjustable pitch motor pulley and adjustable motor base. For each fan furnish an 18 gauge galvanized steel insulated prefabricated curb with integral cant. Furnish baffled sound absorbing curbs where required to obtain noise levels specified. Static pressures scheduled are external to sound curbs.

B. Fans shall be Greenheck, Acme, Carnes, Penn or Loren Cook.

2.17 CENTRIFUGAL WALL EXHAUSTERS:

A. Fans: AMCA certified air and sound ratings, belt or direct driven as shown with permanently oiled bearings, statically and dynamically balanced backward curved blade wheels and spun aluminum housing with disconnect switches, back draft damper and outlet bird screen. For belt driven fans provide V-belt drive sized for 50% overload, adjustable pitch motor pulley and adjustable motor base.

B. Fans: Greenheck, Acme, Penn or Loren Cook.

2.18 IN-LINE CENTRIFUGAL FANS:

A. AMCA approved air and sound rated direct or belt driven fans as scheduled, complete with V-belt drives sized for 50% overload, self aligning grease lubricated ball bearings, adjustable pitch motor pulleys, adjustable motor bases and statically and dynamically balanced backward curved blade wheels, all enclosed in a galvanized steel housing with inlet bell and outlet duct collars. (Fan wheel and motor assembly shall be hinged for access.)

B. Fans shall be Greenheck type SQ, Carnes, Peerless, Acme, Penn or Loren Cook.

2.19 CEILING EXHAUST FANS:

A. AMCA rated direct driven centrifugal fans designed for ceiling mounting, complete with removable white aluminum, ceiling grille insulated housing, fan speed controllers, rubber-in-shear isolators, disconnect switch, and integral back draft damper. Max. noise level: 3 sones.

B. Fans: Greenheck SP, Acme, Penn or Loren Cook.

2.20 PROPELLER FANS:

A. AMCA rated fans, belt or direct driven as scheduled. Equip belt driven fans with V-belt drives sized for 50% overload, adjustable pitch motor pulleys and adjustable motor bases.

B. Equip each fan with belt and wheel guards and a mounting panel not lighter than 16 gauge.

C. Provide gravity or motor operated shutters where indicated in equipment schedule. Equip motor operated shutters with spring return motors with oil-immersed gear trains.

D. Where indicated on plans provide fans equipped with panels reversed for supply operation.

E. Where shown provide penthouses constructed of not lighter than 18 gauge galvanized steel and 18 gauge galvanized steel prefabricated curbs. Equip penthouses with access doors and internal insulation not lighter than 1" x 3 lb/cu. ft.

F. Fans: Coolair, Greenheck, Acme, Stanley or Loren Cook.

2.21 ELECTRIC WALL HEATERS:

A. UL listed recessed convection heaters with finned sheathed heating elements, resiliently mounted direct driven propeller fan with motor heat shield, 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 bargrilles (bars 1/16" x 3/8" minimum). Equip cabinet with adjustable recessing frame. Finish: Baked enamel, over bonderizing. Architect will choose color from manufacturer's standard selections.

C. Electric wall heaters: 2 KW and larger, Markel 3400 series, less than 2 KW, Markel Series 3120, Erincraft AWH or equal.

2.22 ELECTRIC DUCT HEATERS:

A. Slide-in heaters with all sheet metal parts inside duct aluminized or galvanized steel, listed in the Underwriters Laboratories, Inc. Electrical Appliance & Utilization Equipment List.

B. Heaters shall have ceramic supported nichrome wire elements, flanged mounting plate, control box and 1/2" insulation between mounting plate and control box. Provide spacers at terminal end of heater so that internal duct insulation will not cause hot spots. Provide general purpose control boxes for indoor heaters and weather-tight control boxes for heaters located outdoors. (Connections between control box and duct shall be airtight under 1" WG static pressure.)

C. Control box shall contain non-fused disconnect switch, fuse blocks and fuses for each phase, 3 pole contactors for 3 phase heaters and 2 pole contactors for single phase heaters other than 277 and 120 volt heaters. (Contactors shall be designed for quiet operation.) Contactors shall be factory wired to terminal strips.

D. Controls: SCR modulating control with factory wired automatic high limit control, air flow switch, and a supplementary independent thermal device to disconnect all power circuits in case automatic high limit fails, factory supplied control circuit transformers suitable for 24 volt control, factory wired to terminal blocks in control box.

E. Provide staging as shown.

F. Provide camlocked duct access doors at electric heaters.

2.23 ELECTRIC UNIT HEATERS:

A. UL listed electric unit heaters having capacity shown with resiliently mounted direct driven propeller fan with guard, finned-sheathed heating elements, and enameled steel enclosure not lighter than 20 gauge. Heater shall be equipped with automatic reset high limit controls, power contactors and control transformer for 24 volt control, factory wired to terminal strips.

B. For horizontal heaters provide adjustable horizontal louvers. For vertical heaters provide louver.

C. For each unit heater provide room thermostat to cycle contactor and fan. Mechanical Contractor shall provide and install all control wiring in conduit and all control accessories as required for connecting wall mounted thermostat.

D. Electric Unit Heater: Markel 5100 Series or equivalent by Chromalox, Erincraft or Berko.

2.24 UNIT HEATERS (GAS FIRED):

A. AGA approved horizontal suspended unit heaters having capacity shown. Cabinets shall have baked enamel finish.

B. Fans shall be direct driven propeller fans with guards.

C. Heat exchangers: alloy steel and burners shall be (alloy steel), ribbon burners designed for use with natural gas.

D. Gas valve train shall include shut-off cock, pilot cock, gas pressure regulator and (2) stage automatic gas valve.

E. Controls shall include limit control, fan control, control circuit transformer, pilot safety. Controls shall be arranged for 100% shut-off. Pilot shall be a intermittant pilot. Pilot safety shall be automatically reset.

F. Venting system shall be of open type with direct driven centrifugal venter with air flow switch.

G. Unit heaters shall be equipped with adjustable horizontal and vertical discharge louvers.

H. Hang unit heaters from construction overhead using at least 2-3/4" pipe hangers.

I. Unit heaters shall be Raznor or approved equal.

2.25 FURNACES:

A. Furnaces shall be upflow furnaces as shown, AGA approved for use with natural gas.

B. Each furnace shall be complete with alloy steel heat exchanger.

C. Fan shall be a resiliently mounted belt or direct driven forward curved blade centrifugal fan. Belt driven fans shall have oil immersed sleeve bearings, adjustable pitch motor pulley adjustable motor base and capacitor start motor with oil lubricated sleeve bearings. Direct driven fans shall have multi speed motors with motor speed controller and oil lubricated sleeve bearings.

D. Burner shall be complete with gas cock, gas pressure regulator intermittant electrically ignited pilot with electronic flame safeguard system, type 321 (alloy) steel burners, and draft inducer.

E. Cabinet shall be not lighter than 20 gauge steel with baked enamel finish (integral draft diverter) (and not less than 1/2" thick fiberglass insulation,) foil faced except in fan compartment.

F. Controls shall include fan and limit thermostat and fan motor relay.

G. Furnaces shall be Trane or Carrier.

H. Heat exchangers shall bear 10 year pro-rated parts warranty.

2.26 WATER SPECIALTIES:

A. Install ASME rated pressure relief valves as noted, providing full size drain lines to within 1 ft. of floor. Relief valves: Watts, McDonnell & Miller, or equal.

B. Install 1/2" IPS x 75 psig WP float type automatic air vents in water lines as shown and/or required to prevent air binding. Run 3/8" OD line to outdoors or nearest floor drain or AC system drain line from each vent. Install a 1/2" ball valve ahead of each air vent. Vents shall be Armstrong, or equal.

C. Strainers: 125 psig WP, pot or angle type as shown. Strainers 2" and smaller: bronze or iron bodies with screwed connections; strainers 2-1/2" and larger: iron bodies and flanged connections. Screens: bronze, monel metal or stainless steel with perforations as follows:

Strainer Size	Perforation Size
3/4" to 2" inclusive	1/32"
2-1/2" to 6" inclusive	1/16"
8" to 12"inclusive	1/8"
Over 12"	1/4"

The free area of each screen shall be not less than three times the area of the strainer inlet pipe. Equip each strainer with 1/2" valved drain, and unless the strainer design is devoid of air pockets, a 1/4" air vent cock.

D. Compression and expansion tanks: black steel bladder tanks ASME stamped for 125 psig WP. Provide tappings and specialties as shown. (Initial air charge: as required to provide 15 psig fill pressure at top of system.)

E. Line mounted air separators: tangential separators with tappings shown, without strainers. Separators shall be Bell & Gossett.

F. Install float type water feeders on expansion tanks as shown. Feeders: McDonnell & Miller #25.

G. Install backflow preventers equal to Watts 900 in all (potable) city water connections to HVAC water systems.

H. Install air control fittings equal to Bell & Gosset "Airtrol", in all compression tanks and boilers as shown.

I. Install drain valve with hose connection and air venting provision on each compression tank.

J. Flow control valves: weighted check valves with provision for holding valve open, B&G.

K. Install combination flow control and stop valves equal to B&G "triple duty" valves where shown.

L. Install cast iron suction diffusers with integral strainers, flanged connections, flanged covers and gauge, vent, and drain tappings in pump suctions as shown. Main strainer screens: as specified for strainers, above. Remove start-up screens after system has been flushed.

M. Divertor fittings: B&G monoflo fittings, or equal.

N. Radiator valves: union end, 150 psig WP, brass, composition disc, composition mushroom handle, spring packed.

O. Pressure reducing valves for make up water connections 125 psig WP, iron, bronze trim, set point range as required to provide 10 psig fill pressure at top of system, B&G or equal.

P. Install gauge glass sets with valves, drain cock, and protector rods where shown. Do not install gauge glasses on closed compression tanks.

Q. Balancing valves, 2" and smaller: Bronze body, ball type, 125 psig working pressure, 250°F maximum operating temperature, and having threaded ends. Valves shall have fixed orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set positions.

R. Calibrated balancing valves ("Circuit Setter"): 125 psig WP, 2" and smaller bronze, screwed; 2-1/2" and larger IBBM, flanged plug valves. All with indicator for angular position of valve, meter connections with positive shut-off valves and internal seals to prevent leakage around stem. For each valve provide a flow vs. differential pressure vs. angular position calibration chart and pre-formed foam insulation suitable for temperatures from 35 to 250F. Armstrong, B&G, Illinois, Taco or equal.

S. Calibrated angle globe balancing valves: 125 psig WP, 2" and smaller bronze, screwed; 2-1/2" and larger IBBM, flanged angle globe valves. All with indicator for rotation of valve, meter connections with positive shut-off valves and internal seals to prevent leakage around stem. For each valve provide a flow vs. differential pressure vs. rotation position calibration chart and pre-formed foam insulation suitable for temperatures from 35 to 250F. Armstrong or equal. Provide one hand held computerized balancing instrument for project.

T. Flow meters: 150 psig WP venturi flow meters, bronze, screwed in sizes 2" and smaller; steel, butt welded in sizes 2-1/2" and larger, 2% accuracy, maximum line pressure drop 1.0 ft. water. Provide quick connect gauge valves for each venturi meter. For entire job provide one portable cased differential pressure meter with shut-off and vent valves and 40 feet of 150 psig WP hose, together with a calibration curve for each meter. Armstrong, Presco.

2.27 REFRIGERANT SPECIALTIES:

A. Install moulded desiccant core filter dryer in each liquid line. Provide throwaway dryers for lines 1/2" and smaller. Provide replaceable core dryers for lines 5/8" and larger. Dryers shall be Sporlan "Catchall". For heat pump units filter dryer to be bi-directional flow.

B. Install moisture indicating sight glass in each liquid line. Install a refrigerant charging valve in each liquid line near each sight glass.

C. Service valves: wing cap valves, Henry with locking cover.

D. Expansion valves: thermostatic valves with external equalizers, Sporlan.

E. Hot gas bypass valves: self contained valves sized to pass gas flow at last step of compressor unloading and shall discharge between expansion valve outlet and distributor. Sporlan.

F. Install solenoid valve in each liquid and hot gas bypass line. Hot gas solenoid valve shall be equipped with a high temperature coil. Solenoid valves for heat pump units shall be bi-directional flow.

2.28 AIR PURIFICATION SYSTEM:

A. Description of Work:

1. 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.

B. Quality and IP Assurance:

1. Basis of design is Global Plasma Solutions. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section 2.2 at least four weeks prior to bid date.

2. The Air Purification System shall be a product of an established manufacturer within the USA. Direct Current (DC) Ion modules manufactured outside the USA and assembled in the USA on mounting plates or formed channels shall not be acceptable.

3. 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.

4. 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. Any system containing titanium dioxide (Ti02), which has been listed by the CDC as a known carcinogen, shall not be acceptable.

5. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2019 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations. The data shall be based on the manufacturer's use of the same make and model number as the equipment submitted on this project.

6. The Air Purification Technology shall have been tested by UL 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 requesting prior approval shall submit their independent UL 867 test data with ozone results to the engineer for preliminary review and 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.

7. The maximum allowable ozone concentration per the UL 867-2007 chamber test shall be 0.001 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 0.001 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.

8. All manufacturers shall have their product tested to UL 2998 Environmental Standard for confirmation of no ozone with certificate available. The final report shall indicate the ozone levels and high voltage output the device's electrode(s) were operating during the test. Reports that do not include high voltage output during the UL 2998 testing shall not be acceptable.

C. Submittals:

1. Product Data: Submit manufacturer's technical product data for ion generators including:

a. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.

b. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.

c. Performance data for each type of plasma device furnished.

d. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2019 to validate acceptable indoor air quality at the quantity of outside air Scheduled (when projects are designed with outside air reduction).

e. Product drawings detailing all physical, electrical and control requirements.

f. Copy of UL 867 independent ozone test.

g. Copy of UL 2998 conformance certificate.

Statement on the manufacturer's letterhead stating that the technology contains no titanium dioxide (Ti02).

2. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

D. Product Delivery, Storage and Handling:

1. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.

2. Store in original cartons and protect from weather and construction work traffic.

3. Store indoors and in accordance with the manufacturers' recommendation for storage.

E. Warranty:

1. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of eighteen months after shipment or twelve months from owner acceptance, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

F. Products:

1. 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.

2. Basis of Design: Global Plasma Solutions

3. All other Suppliers of comparable products requesting prior approval shall:

   a. Submit for prior approval four weeks in advance in accordance with the requirements of Section 23 0500.

   b. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2019 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 using the same make and model equipment shall also be included.

   c. Submit independent test data from UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.

   d. Submit UL 2998 Environmental Claim Certificate proving no ozone output.

   e. Submit pathogen testing per section 2.2.

   f. Submit at least two other end user references in the same application with contact phone number, email, equipment used and application for the equipment at that facility. Manufacturers not having the above references in similar applications using the same equipment models as proposed on the current project shall not be acceptable.

   g. Ionization bars manufactured using DC output ionization modules shall not be permitted due to corrosion, ion short-circuiting, and intermittent coil coverage and shock hazard.

   h. Ionization bars manufactured using ion modules not having epoxy coating all circuit boards and internal components shall not be acceptable.

   i. Manufacturers submitting as an alternate shall include their DO-160 test results.

   j. It is the responsibility of any alternate manufacturer and mechanical contractor proposing an alternate to the basis of design to confirm any proposed substituted product does not infringe on the patented intellectual property of the basis of design. The engineer and owner recognize the basis of design holds multiple patents and multiple patents are pending.

G. Bi-Polar Ionization Design & Performance Criteria:

1. 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.

2. The Bi-polar Ionization system shall be capable of:

   a. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).

   b. Controlling gas phase contaminants generated from human occupants, building structure, furnishings and outside air contaminants.

c. Capable of reducing static space charges.

d. Effectively reducing space particle counts.

e. When mounted to the air entering side of a cooling coil, keep the cooling coil free from pathogen and mold growth.

f. 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

5) Noro Virus -> 93.5% in 30 minutes or less

6) Legionella -> 99.7% 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 NELAC 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. Products being sold under different trade names than those tested shall not be acceptable.

g. Capable of modular field assembly in six inch (150mm) sections.

3. 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. Ionizers with positive and negative output (DC type) shall not be acceptable. All ionizers provided shall be AC type ionizers with one electrode pulsing between positive and negative.

a. 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.

b. Velocity Profile: The air purification device shall not have maximum velocity profile.

4. 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.

5. Equipment Requirements:

   a. Electrode Specifications (Bi-polar Ionization):

      1) Each alternating current (AC) Ionization Bar with Bi-polar Ionization output shall include a minimum of eighteen carbon fiber cluster ion needles per foot of coil face width shall be provided. The entire cooling coil width shall have equal distribution of ionization across the face. Systems without ion needles at least 0.50" (12.5mm) apart shall not be acceptable. The plasma electrode shall require no more than 1.0" (25mm) in the direction of airflow for mounting. All hardware required for mounting shall be provided by the air purification manufacturer except self-tapping screws for the power supply. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, and performance output reduction over time, ozone production and corrosion.

      2) Electrodes shall be provided in 6.0" (150mm) increments, epoxy filled for an IP55 rating and utilizing brass connection hardware that is recessed into the connection joint once fully engaged and assembled.

      3) Electrodes shall be energized when the main unit disconnect is turned on.

      4) The ionization output shall be a minimum of 60 million ions/cc per inch of cooling coil width as measured 1 inch from the cold plasma needles.

      5) Ionization bars shall be provided with magnet mounting kits to prevent penetration into cooling coils.

      6) Ionization bars shall be constructed of UL 94VO and UL746C composite material.

6. Air Handler Mounted Units:

   a. 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 remote mount power supply using the cables provided by the air purification manufacturer. A 24VAC, 115VAC or 208-230VAC circuit shall be provided to the plasma generator power supply panel. No more than 15 watts shall be required per power supply. Each power supply shall be capable of powering up to 6 ionization bars or a total of 100 linear feet of bar. Each plasma generator shall be designed with powder coated metal casing, liquid tight flexible conduit and a high voltage quick connector.

7. Plasma Requirements:

   a. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.

      1) 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. The device shall be capable of being powered by 24VAC, 115VAC or 208-230VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.

2) Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced (AC Ionizers only are acceptable). Imbalanced levels shall not be acceptable.

3) Ionization output from each bar shall be a minimum of 60 million ions/cc per inch of bar when tested at 1" from the ionization bar. Bars with needles spaced further apart than 0.5" shall not be acceptable.

4) Each plasma electrode shall be made from an all composite, UL 94V0 and UL 746C rated material for prevention of corrosion and electrical insulation.

b. Ozone Generation:

1) The operation of the electrodes or Bi-polar ionization units shall conform to UL 2998 as tested by UL proving no ozone output.

8. Electrical Requirements:

a. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 24VAC, 115 VAC or 208-230VAC, 1 phase, 50/60 Hz. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

9. Control Requirements:

a. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset. Systems requiring fuses shall not be acceptable.

b. The Plasma Generator power supply shall have internal circuitry to sense the ionization output and provide dry contact alarm status to the BMS as well as a local "Plasma On" indication light.

c. If scheduled, the ionization system shall be provided with a stand-alone, independent ion sensor designed for duct mounting to the ionization bar to monitor the ion output and report to the BAS system that the ion device is working properly. Ion systems provided without an independent ion sensor, shall not be permitted. The control voltage to power the ion sensor shall be 24VAC to 260VAC and draw no more than 150mA of current. The sensor shall provide at minimum, dry contact status to the BAS and optionally a BacNet or Lonworks interface as specified on the control drawings. If scheduled, manufacturers not providing a stand-alone ion sensor shall not be acceptable.

d. 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.

e. An optional fiberglass NEMA 4X panel with Plasma On/Off Indicator Light (interfaced with stand-alone ionization detector), Ionization Output On/Off Indicator Light and an On/Off Illuminated Switch shall be provided to house the power supply, if noted on the schedule.

H. Execution:

1. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

I. Assembly & Erection: Plasma Generator:

1. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.

2. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.

3. All equipment shall be protected from dust and damage on a daily basis throughout construction.

J. Testing:

1. Provide the manufacturers recommended electrical tests.

K. Commissioning & Training:

1. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

END OF SECTION

SECTION 23 6000

AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SCOPE:

A. Section 230500 – "General Provisions – HVAC" shall apply to and become part of this Section.

1.2 SHOP DRAWINGS:

A. See Section 230500 – "General Provisions – HVAC".

B. Ductwork Shop Drawings shall include details of duct construction: seams, joints, gauges, reinforcing, elevations, and hanger details for each pressure class and size range together with details of turning vanes, branch connections, dampers and access doors. Include access door locations and sizes. Identify on the shop drawings duct sections as they will be identified for fabrication and installation. Provide section drawings of locations where ducts cross or demonstrate with elevations that ducts will fit.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Air terminal submittal data shall include, for each terminal, both radiated and discharge sound power in DB re 10 to the minus 12 watts in octave bands 2 through 7. All air terminal controls shall be installed in a unit mounted control panel and shall be UL listed as an assembly.

2.2 VARIABLE AND CONSTANT VOLUME TERMINAL BOXES:

A. Variable volume units consisting in general of a single duct attenuating box with automatic volume regulator. Where shown, provide hot water heating coil. Maximum air pressure drop through box, reheat coil and attenuator (where required) shall not exceed 0.5" WG. Air terminal boxes shall be ARI certified and UL listed as an assembly.

B. Discharge sound power levels referenced to 10 to the minus 12 watt in second through seventh octave bands, respectively, shall not exceed the following for boxes operating with 1" static pressure difference. Boxes up to 300 CFM: 67 DB, 62, 50, 49, 45, 40. Boxes over 300 CFM: 76DB, 69, 67, 62, 58, 52. Provide rectangular sound absorbers if required to meet above noise criteria. (See "Sound Absorbers", below.) Locate sound absorbers at least 5 inlet diameters downstream from boxes.

C. Radiated sound power for boxes operated with 1" static pressure difference shall not exceed 60 DB re 10 to the minus 12 watt in the second octave band (125 cps).

D. Attenuating box shall be constructed of G90 galvanized steel sufficiently heavy to prevent oil canning and fluttering but not lighter than SMACNA gauge for 2" pressure class duct of same dimensions as box. Box shall be lined with 1/2" thick glass fiber sound insulation complying with fire hazard classification specified for duct insulation. No insulation edges shall be exposed in box. Each box shall be equipped with an access door for access to coil and volume regulator. (Provide presized glass cloth facing for insulation in boxes scheduled to have "medical lining".)

E. Coils shall comply with the requirements for Coils, Section “Heating and Air Conditioning Equipment and Specialties”. Coil casings, return bends and headers shall be equipped with sheet metal covers insulated with 3/4” foamed plastic insulation to prevent sweating. See insulation section for foam plastic insulation specification.

F. Box controls shall provide pressure independent operation and velocity sensors shall be of multiple point averaging type, unaffected by inlet conditions. (If box manufacturer requires straight duct on box inlet, such straight duct shall be furnished with the box.) All box controls except room thermostat and water coil valve shall be factory installed and shall be calibrated by the box manufacturer. Controls shall be by the control manufacturer (except velocity sensor and volume dampers shall be furnished by the terminal manufacturer), and shipped to the terminal manufacturer for installation and calibration. Controls shall be Direct Digital Control as specified. Pressure taps and a calibration curve or similar method of field measuring box air rate shall be provided for each box. A photostat of the box control diagram shall be cemented to each box. Permanently mount all relays and pressure switches on box and provide control panel with cover for all controls.

G. Provide single point power connection for all components, electric heater fusing and auxiliary protection, and disconnect switch. Provide 24 volt control power transformer as required for single point power connection.

H. Box control schemes shall be as shown on drawings.

I. Boxes shall be Enviro-Tec, Price, Titus, or Trane.

2.3 GRILLES, REGISTERS AND DIFFUSERS:

A. General: Air devices may be Price, Titus, Krueger, Nailor, or approved equal. Titus part numbers are given for reference. Coordinate border and frame types for air devices with ceiling types as shown on Architectural Reflected Ceiling Plan.

B. Rectangular Louver Face Diffusers One-, Two-, Three-, Four-Way or Corner Throw (LD or CD): Fixed pattern louver face diffusers, all aluminum with white enamel finish, removable cores latched in place, opposed blade dampers, adjustable multiblade scoops, #TDC,-AA.

C. Linear Diffuser/Boot: Fixed pattern extruded aluminum 2-way throw diffuser designed for variable volume use, mounted on outlet of galvanized steel boot with 1/2" internal insulation, and round side inlet collar with damper. Diffuser/Boot shall be designed to lay into ceiling grid and be supported by grid. Provide all necessary mounting clips and accessories. Boot insulation shall comply with the requirements for duct insulation, internal. Diffuser finish: off white enamel, #MLF.

D. Supply Registers (SR): Adjustable vertical face bars, adjustable horizontal rear bars, opposed blade dampers, plaster frames, adjustable multiblade scoops, all aluminum with prime coat finish: #272.

E. Drum Louvers (DL): Adjustable vertical blades and rotating drum with optional opposed blade damper with screwdriver operator accessible through discharge of DL. All aluminum finish with prime coat.

F. Wall Return Registers (WRR): All aluminum, aluminum lacquer finish, horizontal bars fixed at about 35° angle, plaster frames, opposed blade damper #350. (Wall Return Grilles {WRG} Delete opposed blade damper).

G. Wall Exhaust Registers (WER): Same as wall return registers.

H. Ceiling Return Registers (R): All aluminum, 1/2" x 1/2" x 1/2" cube core, plaster frame, opposed blade dampers, white enamel finish #50F. Omit dampers for registers not attached to return ductwork.

I. Ceiling Exhaust Registers (E) and Ceiling Transfer Registers (T): Same as Ceiling Return Registers.

2.4 SHEET METAL SPECIALTIES:

A. Make rectangular take-offs in low pressure supply, return, and exhaust ducts using 45° entry tap (SMACNA Duct Construction Standards “Branch Connections” figure #2-6) with manual damper with end bearings and locking quadrant in branch. Saw-mark ends of damper rods parallel to blades. End bearings and quadrants shall have air tight duct connections and shaft seals: Duro-Dyne or equal.

B. Manual balancing dampers: comply with SMACNA HVAC Duct Construction Standards, figure 2-12 and 2-13. Equip all dampers with locking quadrants and end bearings. Saw-mark ends of damper rods parallel to blades. End bearings and quadrants shall have air tight duct connections and shaft seals, Duro-Dyne or equal.

C. When Damper quadrants are located other than above lay-in ceilings.

1. Substitute Young number 315 or 270-896C adjustable cover concealed regulators or Ventlock #677 regulators and an additional end bearing for the quadrant (regulator covers shall be white). Provide all cable, gears, joints, rods, etc. as required to place the regulator in the ceiling within 6 feet horizontal of the damper, as directed by the Architect.

2. Provide an access door for access to the quadrant (See "Access Doors", hereinafter).

D. Provide "Stand-offs" (hat sections) for damper quadrants, controls, etc., on externally insulated ducts. "Stand-offs" are required at quadrants on spin-in dampers.

E. Branch duct connections for connecting round low pressure branches to rectangular low pressure trunks: galvanized steel spin-in or side takeoff fittings with integral dampers, collars, similar and equal to Flexmaster, Series FLD or STOD for sheet metal trunks with stand-offs. Provide integral dampers with 2” insulation build-out, shaft, U-bolt, nylon bushings, locking quadrant and handle. Gauges: as required for pressure class. (26 gauge minimum.)

F. Branch duct connections for connecting round medium pressure duct to rectangular medium pressure duct: galvanized steel bellmouth fitting with neoprene gasket and pre-drilled mounting holes equal to Buckley Air-Tite. Gauges as required for pressure class (24 gauge minimum). Flexmaster STO or approved equal may be substituted at contractor’s option (24 gauge minimum). Branch duct connections for connecting round medium pressure duct to round or flat oval medium pressure duct: galvanized steel conical saddle or flanged fitting equal to United. Gauges as required for pressure class (22 gauge minimum).

2.5 FLEXIBLE DUCT CONNECTIONS:

A. Install Neoprene coated glass cloth flexible connections at all duct connections to all fans, all AC Units and all powered induction units. Install braided copper grounding straps across two sides of the connection.

B. Install flexible connections in all ducts at building expansion joints.

2.6 ELECTRICAL GROUNDING:

A. Ground supply fans.

B. Install braided copper jumpers around all flexible connections, taking care that jumpers do not bind flexes.

2.7 DUCTWORK - GENERAL:

A. 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 workmanship manner with adequate bracing and cross breaking to prevent breathing, rattling, and vibration. **DO NOT USE SNAP-LOCK SEAMS**.

B. Install Duro-Dyne locking quadrants and Duro-Dyne end bearings on all splitters and manual volume dampers located above accessible ceiling and Young #315 regulator, and Duro-Dyne end bearings elsewhere. Provide stand-offs for quadrants on externally insulated ducts. (Refer also to “Sheet Metal Specialties.”)

C. Duct dimensions are **net dimensions inside insulation**. Determine gauges by actual duct size.

D. All duct turns (except as noted below for 90 degree turns) shall be radiused with a centerline radius of 1.5 times the duct width in the plane of the turn. At the contractor’s option, 90 degree turns may be square throat elbows vaned to provide a dynamic loss coefficient (“C”) not greater than 0.2 or shall be radiused. Do not use “push on” vane runners. Duct turns less than 20 degrees may be mitered. Do not use off-sets that reduce the cross-sectional area of the duct.

E. Duct Sealing: Seal duct seams and joints after assembly as noted below. Seal entire circumference of all branch duct connections, tapping collars and spin-ins. Seal ducts using mastic sealant equal to solvent based United Duct Sealer.

1. Class A Seal: Seal all joints and seams and leak test at pressure specified. Leakage cfm per 100 sq. ft. duct surface area shall not exceed 8 times the square root of the test pressure in inches of water and no leaks shall be audible.

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 corners of transverse joints.

2.8 DUCTWORK - MEDIUM PRESSURE, RECTANGULAR:

A. Ductwork medium pressure, rectangular shall include all supply duct between air handler and VAV terminal duct.

B. Provide galvanized steel sheet metal ducts of sizes shown on plans, and construct gauges and recommended detail for 4" pressure class as contained in current edition of the SMACNA Duct Construction Standards. **DO NOT USE SNAP-LOCK SEAMS.** Use reinforcement noted for the longest side on all sides of the duct and bolt together at corners with minimum 5/16" diameter bolts. Do not penetrate duct at reinforcement or hangers.

C. Rectangular plenums at air handling unit discharge for connections of flat oval supply ductwork or rectangular return ductwork shall be factory insulated galvanized steel consisting of an 18 ga. outer shell, 1" fiberglass insulation, and 24 gauge perforated steel liner with mylar film between insulation and perforated liner. United Rectangular K-27, Eastern Sheet Metal or approved equal.

D. Provide hangers for medium pressure rectangular ducts consisting of a P2000 Unistrut trapeze and 3/8" diameter rods. Do not penetrate the ductwork with screws at the hangers.

E. Seal all ducts to SMACNA Class (A) classification and pressure leak test at 6" WG.

F. All exposed ductwork shall be provided with "paint grip" finish to accept epoxy paint finish. No adhesive labels shall be placed on the exposed surface of exposed ductwork.

2.9 DUCTWORK - MEDIUM PRESSURE (ROUND):

A. Medium pressure ductwork round includes all unlined round ducts between AC Unit discharges and terminal units.

B. Ductwork: Factory fabricated galvanized steel round spiral lock seam ducts of 26-gauge for ducts up to 8" in diameter, 24 gauge for ducts from 9" to 22", and 22-gauge for ducts 24" through 36" in diameter and 20 gauge for ducts over 36" in diameter. Lock seams shall be spaced on not more than 3" centers for ducts up to 5" in diameter, 6" centers for ducts from 6" through 10", and 8" centers for ducts 12" and over in diameter.

C. At contractor's option ducts over 22" in diameter may be fabricated using sealed grooved or continuously welded longitudinal seams. Gauges for longitudinal seam ducts: 20-gauge for ducts from 24" to 36" in diameter, 18-gauge for 37" to 50", and 16-gauge for ducts over 51" in diameter.

D. Fabricate fittings by continuous brazing or continuous electric welding. Thickness of metal for round fittings: as specified for longitudinal seam ducts but not less than 22 gauge. Elbows shall have centerline radius of 1.5 diameters, 5 piece construction over 8" diameter, die stamped 8" and smaller. 90-degree take-offs shall be made with conical tees. Make connections to plenums with bellmouths.

E. Make transverse joints using beaded slip couplings, sealing compound equal to solvent based United "Duct Seal", and sheet metal screws.

F. Seal all ducts to SMACNA Class (A) classification and pressure and leak test ducts at 1-1/2 times pressure class, 6" WG.

G. Hang ducts using 1" x 12-gauge straps at transverse joints but not more than 8'-0" apart. Straps shall completely encircle duct and shall be secured to construction with powder driven studs. Do not penetrate the ductwork with screws at the hangers.

H. Secure vertical ducts at floors using riser clamps.

I. No adhesive labels shall be placed on the exposed surface of exposed ductwork.

J. Duct and fittings shall be United McGill Airflow, Semco, Spiral Systems, Spiral Pipe of Texas or Eastern Sheet Metal.

2.10 DUCTWORK - MEDIUM PRESSURE ROUND DOUBLE WALL:

A. Medium pressure round double wall ductwork includes all round ducts between AC Unit discharges and terminal units.

B. Ductwork: Factory fabricated and insulated galvanized steel round spiral lock seam ducts with outer shell, 1" thick fiberglass insulation inside shell, interior perforated steel liner with mylar film between insulation and liner. Duct gauges shall be 26-gauge for ducts up to 8" in diameter, 24 gauge for ducts from 9" to 22", and 22-gauge for ducts 24" through 36" in diameter and 20 gauge for ducts over 36" in diameter. Lock seams shall be spaced on not more than 3" centers for ducts up to 5" in diameter, 6" centers for ducts from 6" through 10", and 8" centers for ducts 12" and over in diameter. Interior perforated steel liner shall be minimum 24 gauge.

C. Fabricate fittings by continuous brazing or continuous electric welding. Thickness of metal for round fittings: 20-gauge for ducts up to 36" in diameter, 18-gauge for 37" to 50", and 16-gauge for ducts over 51" in diameter.

D. Elbows shall have centerline radius of 1.5 diameters, 5 piece construction over 8" diameter, die stamped 8" and smaller. 90-degree take-offs shall be made with conical tees. Make connections to plenums with bellmouths. Fittings shall have insulation and liner same as ductwork noted above.

E. Make transverse joints using beaded slip couplings, sealing compound equal to solvent based United "Duct Seal", and sheet metal screws.

F. Seal all ducts to SMACNA Class (A) classification and pressure and leak test ducts at 1-1/2 times pressure class, 6" WG.

G. Hang ducts using 1" x 12-gauge straps at transverse joints but not more than 8'-0" apart. Straps shall completely encircle duct and shall be secured to construction with powder driven studs. Do not penetrate ductwork at hangers.

H. Secure vertical ducts at floors using riser clamps.

2.11 DUCTWORK - LOW PRESSURE:

A. Ductwork, Low Pressure, shall include: All return duct, outside duct and all supply other than medium pressure between AHU & VAV terminal.

B. Construct ducts in accordance with SMACNA Duct Construction Standards for pressure and seal classes noted below. Do not use snap-lock seam.

C. Pressure and Seal Classes: 1" Pressure Class, Seal Class "C".

D. Seal all existing supply, return and exhaust ducts which are an integral part of new or modified systems (but which are not externally insulated) as specified above for new work of the same type.

E. Hang ducts using 1"x12-guage galvanized straps at transverse joints but not greater than 8 ft. apart.

F. All exposed ductwork shall be provided with "paint grip" finish to accept epoxy paint finish. No adhesive labels shall be placed on the exposed surface of exposed ductwork.

G. Provide galvanized sheet steel metal ducts of sizes shown on plans, construct, hang, support and reinforce in accordance with 2" Pressure Class as contained in the current edition of the SMACNA Duct Construction Standards. Use reinforcement noted for the longest side on all sides of the duct and bolt together at corners with minimum 5/16" diameter bolts. Do not penetrate duct at reinforcement with screws. **DO NOT USE SNAP-LOCK SEAMS.**

2.12 DUCTWORK LOW PRESSURE ROUND:

A. Low pressure round ductwork includes all round supply, return, outside air, and exhaust ductwork except as specified medium pressure round ductwork.

B. Ductwork: Factory fabricated single-wall galvanized steel round spiral lock seam ducts of 28 gauge for ducts up to 14" in diameter, 26 gauge for ducts from 15" to 26" in diameter, 24 gauge for ducts 27" to 36" in diameter, and 22 gauge for ducts over 36" in diameter.

C. Fabricate fittings by continuous brazing or electric welding. Thickness of metal for round fittings: 26 gauge for fittings up to 14" in diameter, 24 gauge for fittings 15" to 26" in diameter, 22 gauge for all fittings over 26" in diameter. Elbows shall have a center-line radius of 1.5 diameters, 5 piece construction. Take-offs shall be 45 degree laterals. Splitters (tees) shall be reducing Y-Branch with dampers.

D. Make transverse joints using beaded slip couplings, sealing compound equal to solvent based United Duct Seal and sheet metal screws.

E. Provide hanger straps per SMACNA table no more than 8 ft. apart. Straps shall encircle duct. Do not penetrate ductwork at hangers.

F. No adhesive labels shall be placed on the exposed surface of exposed ductwork.

G. Ductwork and fittings shall be United McGill Airflow, Semco, Spiral Systems, Spiral Pipe of Texas or Eastern Sheet Metal round duct and fittings, 2" WG standard.

2.13 FLEXIBLE DUCTS:

A. Flexible duct connectors: 2 element spiral construction composed of galvanized steel supporting spiral and coated woven textile fabric with metal or mineral base, UL listed as Class I Air Duct and Connector (UL 181).

B. Flexible connectors shall not exceed 5 feet in length and turns shall not exceed 20 degrees with maximum of two turns.

C. Make connections between flexible ducts and other equipment using galvanized steel draw bands with plated screws and buckles and United Duct seal for high and medium pressure ducts and nylon draw bands for low pressure ducts.

D. Factory insulate cold flexible ducts using insulation equivalent to that specified for cold ducts minimum R5 rating and provide continuous vapor barrier at connections to other ducts and equipment.

E. Hang ducts in accordance with manufacturer's instructions.

F. Flexible ducts: Thermaflex M-KC, EverClean, or Flexmaster Type 4M.

2.14 OUTSIDE AIR INTAKE HOOD:

A. Factory fabricated aluminum hood with integral curb cap and birdscreen. Hinge top of hood and weld all vertical seams. Equip hood with galvanized steel curb with wood nailer. Minimum material gauges, hood 20 gauge, base 18 gauge, curb 18 gauge.

B. Intake hood: Penn or equal.

2.15 WEATHER LOUVERS:

A. Louvers shall be AMCA certified 6" thick extruded aluminum drainable stationary louvers with minimum 0.08" thick blades and frame and minimum 50% free area nominal. Equip with 1/2" mesh aluminum birdscreen on inside of louver. Color to be selected by Architect. Finish to be manufacturer's Kynar 500 Fluoropolymer coating conforming to AAMA 605.2. Provide samples of color and finish to Architect for approval. Air pressure drop shall not exceed 0.15" WG at maximum air velocity of 850 FPM through free area. Water penetration shall not exceed 0.01 ounces per SF of free area.

B. Louvers shall be Ruskin ELF6375DX or equivalent by Greenheck, or approved equal.

2.16 AUTOMATIC DAMPERS:

A. Provide and install automatic dampers as shown on plans, scheduled, or as required. Coordinate size, quantity and locations of automatic dampers with automatic control work as required. Dampers shall be factory fabricated with extruded aluminum blades and frames.

B. Damper frames shall be 5" x 1" x .125" (minimum thickness) extruded aluminum hat channel with hat shaped mounting flanges on both sides of the frame. Each corner shall be reinforced with two die formed internal braces and machine staked for maximum rigidity or integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking.

C. Damper blades shall be airfoil type extruded aluminum with metal blade to metal blade overlap. Each blade shall be maximum 6" depth with integral structural reinforcing tube running full length. Minimum thickness of blade shall be 0.070". Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Provide symmetrical blades of varying size as required to completely fill the damper opening. Blade orientation is horizontal. Blade operation is parallel or opposed. Blades shall be contained within the damper frame.

D. Blade edge seals shall be flexible and suitable for -72°F to +275°F mechanically locked in extruded blade slots yet easily replaceable in field. Jamb seals shall be flexible stainless steel, compression type to prevent leakage between the end of the blade and the damper frame. Use of blade end to overlap the frame for jamb seal is not acceptable. Adhesive or clip-on type blade or jamb seals are not acceptable.

E. Bearings shall be non-corrosive molded synthetic. Axles shall be 1/2" plated steel hexagonal shaped and to provide positive locking connection to blade. Linkage shall be concealed out of airstream, within frame to reduce pressure drop, noise and maintenance.

F. Provide and install Electric, 24 or 120V AC, spring return, 2-position or modulating damper actuator(s) as specified in controls specification sections or as indicated on drawings. Actuator(s) shall be sized as required to sufficiently open/close dampers under operating conditions. Multiple actuators shall be provided as required.

G. Install dampers in accordance with manufacturer's installation instructions and requirements. Install dampers square and free from racking.

H. Dampers must be accessible to allow inspection, adjustment, and replacement of components. Provide and install access doors as specified and required.

I. Provide and install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Attach multiple damper section assemblies together in accordance with manufacturer's instructions. Install support mullions as reinforcement between assemblies as required.

J. Submittal shall include leakage, maximum airflow and maximum pressure ratings based on AMCA Publication 500. Damper shall be tested and licensed in accordance with AMCA 511 for Air Performance and Air Leakage. Damper shall meet the leakage requirements of the International Energy Conservation Code by leaking less than 3 cfm/sq. ft. at 1" of static pressure and shall be AMCA licensed as Class 1A.

K. Saw-mark ends of damper rods parallel to blades.

L. Rectangular dampers shall be Ruskin Model CD50, Greenheck VCD-43, or preapproved equivalent.

M. Round dampers shall be Ruskin Model CDRS25, Greenheck VCDR-53, or preapproved equivalent.

2.17 FIRE DAMPERS:

A. Provide and install UL labeled 1-1/2 hour fire dampers, wherever sheet metal ducts pass through chase walls, floors outside fire chases, and elsewhere as shown or required by local code. See Architectural plans for fire ratings of walls. All fire dampers required may not be shown on mechanical plans.

1. Fire dampers shall be "venetian blind" dampers. Unless otherwise shown folded blades and frames shall not obstruct air stream. Provide type C fire damper in all medium and high pressure supply ducts. Dampers in floors shall be spring loaded.

2. Provide factory fabricated steel wall (floor) sleeve 3" longer than wall thickness for each fire damper and install sleeve using bolts and angles as detailed in Plate #1 of SMACNA "Fire Damper Guide."

B. Install Ceiling Fire Dampers as shown in Detail "A", Plate #5 of SMACNA "Fire Damper Guide" at ceiling penetrations where required by local code.

C. Install access door in medium pressure ducts downstream from each fire damper. Install access door in low pressure ducts at each fire damper. Install wall or ceiling access door for access to fire dampers not accessible through lift-out ceilings. See ACCESS DOORS, below.

D. Provide and install UL Labeled three hour fire dampers where sheet metal ducts pierce fire walls. Fire dampers shall have folded interlocking blades that do not obstruct the duct. Install in factory fabricated sleeve 3" longer than wall thickness in accordance with SMACNA "Fire Damper Guide" Plate #1. Air Balance Inc. Model 319BL or equal.

2.18 ACCESS DOORS:

A. Access doors in low pressure ducts: galvanized steel frame flange mounted permanently secured to duct with a hinged gasketed access port held in place with thumb operated latches. Doors in insulated ducts: double thickness with insulation. Doors in non-insulated ducts: a single thickness. Size doors to permit removal of equipment or maintenance. Minimum 18” x 18” in ducts 20” or greater. Minimum 12” x 12” in ducts 14” to 18” and minimum 8” x 12” in ducts 10” to 12”. If duct is less than 10”, enlarge duct at access door (and fire damper, if applicable) to allow minimum 8” x 12” access door. Kees “FH” series standard pressure flanged mount. Install for flush interior on double wall doors.

B. Access doors in medium pressure supply ducts: Factory fabricated combination view/access/vacuum-relief doors consisting of a galvanized steel frame welded to duct with double wall inwardly-opening transparent plastic door. Latches shall secure plastic door to frame but release door into duct to act as a vacuum breaker. Attach a retaining chain to frame and door for doors without hinges. Door size (minimum) 8 x 12 for round ducts up to 12" diameter, and oval or rectangular ducts up to 16" maximum side; 12 x 12 for round ducts 13" to 18" and rectangular ducts 17" to 24" maximum side and 14" x 20" for larger ducts. Doors shall be tight under 10" WC pressure and shall pop open under 6" WC vacuum. Kees FIN-H high pressure flanged mount on rectangular ductwork. Kees ADH-HP for round ductwork or round side of flat-oval ductwork.

C. Mark access points in lift-out ceilings with colored vinyl stick-on discs. Locate discs on grid adjacent to point of access and coordinate location of access doors in non-accessible ceiling with General Contractor.

END OF SECTION

SECTION 23 7000

HVAC TESTING AND BALANCING

PART 1 - GENERAL

A. Provisions of Section 23 0500 - "General Provisions - HVAC" shall apply to and become a part of this section.

B. The HVAC testing and balancing work specified in this section shall be done by an Associated Air Balance Council (AABC) member or by a National Environmental Balancing Bureau (NEBB) member (and an AABC "National Project Performance Guarantee" shall be provided for the project). The Testing and Balancing Agency's (TABA) project manager shall be an AABC certified or NEBB certified testing and balancing engineer and be responsible for supervision of and certification of the work herein specified.

C. The Testing and Balancing agency will be employed by the mechanical contractor.

D. The balancing agency shall submit records of experience in the field of air and hydronic system balancing or any other data as requested by the Architect and Engineer. The supervisory personnel for the firm shall have at least five (5) years' experience, and all the employees used in this project shall be qualified technicians in this specific field.

E. The balancing agency shall furnish all necessary calibrated instrumentation to adequately perform the specified services. An inventory of all instruments and devices in possession of the balancing agency may be required by the Architect and Engineer to determine the balancing agency's performance capability.

1.2 SCOPE:

A. All air and water balance work shall be done in accordance with the AABC National Standards for Testing and Balancing Heating & Air Conditioning Systems (AABC National Standards), or NEBB National Standards edition in force at time of bidding. If these specifications set forth more stringent requirements than the AABC National Standards, these specifications shall prevail.

B. The systems to be balanced and/or tested shall include:

1. Chilled water system.
2. Hot water system.
3. Air handler and VAV air distribution system.
4. All exhaust systems.

1.3 DOCUMENTS:

A. The architect will provide the balancing agency one copy of each of the following documents:

1. Project drawings and specifications.
2. Approved construction revisions pertaining to the HVAC systems.

3. Approved submittal data on HVAC equipment and systems to be installed under Division 23.

4. Approved HVAC shop drawings.

5. Approved HVAC wiring diagrams, control diagrams and equipment brochures, as appropriate.

1.4 COORDINATION:

A. The TABA shall perform its services in close coordination with the work specified in Division 23.

B. The plans and specifications indicate meters, valves, dampers, etc. for the purpose of adjusting the HVAC systems to obtain optimum operating conditions. In the event that any of meters, valves, dampers, etc. have been installed in a manner which will not permit their being used for their intended purpose, TABA shall so notify the Mechanical Contractor so that the above items may be correctly installed as specified in the other sections of Division 23.

C. Work included in this section shall not be started until the systems involved meet the following conditions:

1. Air Distribution Systems

a. Systems have been completed (including sealing and/or leak testing where specified) with all components properly installed and ready for operation, fans are rotating correctly, motor starters have correct overload elements, variable speed drives have been put into operation and clean filters (of the type required for finished system) have been installed.

b. All dampers, including automatic dampers, are operating smoothly and without binding and that the automatic dampers close tightly and open wide without binding.

2. Water Circulating Systems:

a. Systems have been completed, including leak testing and cleaning and until systems have been refilled, pumps are rotating correctly, correct overload elements have been installed in pump motor starters (variable speed drives have been put into operation) and strainers have been cleaned and baskets used for the ultimate installation have been installed.

b. Compression tanks have been installed and correct system pressure is being maintained, all air vents have been installed and system has been vented and is free from air.

3. Automatic Control System:

a. Systems have been completed and are operating as designed.

1) Installation is complete, all instruments (including room thermostats) have been field calibrated and operate correctly, and are set for design operating conditions.

2) TABA personnel have been instructed in the proper use of and in changing set points of the various controllers including via computer or keypad if required.

1.5 NOTIFICATION FOR TESTING & BALANCING WORK TO BEGIN:

A. When the above conditions have been met, the Mechanical Contractor shall notify the TABA in writing that the system(s) are ready for Testing and Balancing.

B. When the TABA has been notified that the systems are ready for testing and balancing, the TABA shall inspect the various systems involved and notify Mechanical Contractor of any condition which may impede the TAB work (missing dampers, valves, incomplete control or electrical work, etc.).

C. When the deficiencies noted above have been corrected, Mechanical Contractor shall again notify TABA that the system(s) are ready for testing and balancing.

1.6 INSPECTIONS:

A. During construction the TABA shall inspect the installation of the piping systems, sheet metal work, control system and mechanical equipment.

B. The inspections should be made when 60% of the ductwork has been installed and when 90% of the equipment has been installed.

C. The TABA shall submit a brief written report of each inspection to the Mechanical Contractor.

1.7 TESTING AND BALANCING PROCEDURES:

A. All testing and balancing work shall be done in accordance with the AABC National Standards.

B. Air Systems:

1. Fan Speed: Test and adjust fan RPM to achieve design CFM requirements.

2. Current and Voltage: Measure and record motor current and voltage of each fan.

3. Pitot-tube Traverse: Perform a Pitot-tube traverse of main supply and return ducts to obtain total CFM. If a Pitot-tube traverse is not practical, the summation of the outlets or inlets may be used. An explanation why a traverse was not made must appear on the appropriate data sheet.

4. Outside Air: Test and adjust system minimum outside air by Pitot-tube traverse. If a Pitot-tube traverse is not practical, the percentage of outside air may be determined by calculations from the return air, outside air, and discharge air temperatures with heating and cooling coil valves shut. Make allowances for heat of compression and motor heat where applicable.

5. Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.

6. Air Temperature: Take wet-bulb and dry-bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

7. Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.

8. Main Ducts: Adjust main ducts to within design CFM requirements and traverse for total CFM quantities.

9. Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

10. Tolerances: Test and balance each diffuser, grille and register to within -5% and +10% of design requirements.

11. Identification: Identify the location and area of each grille, diffuser, register, and terminal box. This information shall be recorded on air outlet data sheets.

12. Description: Record the size, type and manufacturer of each diffuser, grille and register on air outlet data sheets.

13. Terminal Boxes: Set volume regulators on all terminal boxes to meet design maximum and minimum CFM requirements. All associated temperature controls shall be checked for proper operation and calibration. If the terminal boxes have separate settings for heating and cooling CFM, the CFM quantities for each shall be recorded on air outlet data sheets. All diffusers connected to the terminal box shall be read in the heating and cooling modes and their readings recorded on air outlet data sheets.

14. Minimizing Drafts: Set grille bars for throws, diffusers for patterns and adjust all diffusers, grilles, and registers to minimize drafts in all areas.

C. Water Circulating System Procedures:

1. The various water circulating systems shall be filled, purged of air and put into operation by the contractor before hydronic balancing is begun.

2. The flow of water through all coils shall be adjusted by manipulating balancing valves until the rated pressure drop through the coil or metering device is obtained.

3. Water Treatment: Examine the water in the system and determine if the water has been treated and cleaned. If it has not, request the contractor to clean and treat the water.

4. Strainers: Request that the contractor clean all strainers.

5. Air Vents: Check all air vents at the high points of the water system and determine if they are installed and operating.

6. Valves: Set all balancing valves and automatic temperature control bypass valves to the full-open position for balancing. For three-way valves, the rated pressure drop shall first be adjusted with the three-way valve set so that all water flows through the coil. The bypass balancing valve shall then be adjusted on each coil until equal pressure drop between supply and return connections is obtained, with the three-way valve set to bypass the coil.

7. Pumps: Adjust circulating pumps to meet design GPM requirements. Check pumps for proper operation. Pumps shall be free of vibration and cavitation. Measure and record operating current and voltage.

8. Central Plant: Adjust water flow from the central plant if applicable.

9. Tolerances: Proceed to balance all chilled-water and hot-water coils within 10 percent of design requirements.

10. Marking: Mark all settings and record all data after completing the flow readings and coil adjustments.

D. Verification of Temperature Control:

1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water reset, and fire and freeze stats.

2. Verify that all controlling instruments are calibrated and set for design operating conditions.

3. Verify the accuracy of the final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.

1.8 TEST AND BALANCE REPORT:

A. The test and balance report shall be complete with logs, data, and records as required herein. All logs, data, and records shall be typed on white bond paper and bound. The report shall be certified accurate and complete by the balancing agency's certified test and balance engineer. Any drawings submitted must be to a scale of 1/8" per foot or larger.

B. Six (6) copies or PDF electronic file of the test and balance report are required and shall be submitted to the Architect and Engineer.

C. The report shall contain the following general data in a format selected by the balancing agency:

1. Project Number

2. Contract number

3. Project title

4. Project location

5. Project architect

6. Project mechanical engineer

7. Test and balance agency

8. Test and balance engineer

9. General contractor

10. Mechanical subcontractor

11. Dates tests were performed

12. Certification

D. The test and balance report shall be recorded on report forms conforming to the recommended forms in the AABC or NEBB National Standards. At a minimum, the report shall include:

1. Preface: A general discussion of the system, any abnormalities and problems encountered.

2. Instrumentation List: The list of instruments including type, model, manufacturer, serial number and calibration dates.

3. System Identification: In each report, the VAV boxes, zones, supply, return, and exhaust openings, and traverse points shall be numbered and/or lettered to correspond to the numbers and letters used on the report data sheets.

4. Air handling equipment test report forms: Record the following on each air-handling equipment test form:

   a. Manufacturer, model number and serial number

   b. All design and manufacturer-rated data

   c. Total actual CFM by traverse if practical. If not practical, the sum of the outlets may be used, or a combination of these procedures. For specific systems, such as ones with diversity, see the AABC *National Standards.*

   d. Suction and discharge static pressure of each fan, as applicable.

   e. Outside air, return air and total CFM.

   f. Actual operating current, voltage and brake horsepower of each fan motor.

   g. Final RPM of each fan.

   h. Fan and motor sheave manufacturer, model, size, number of grooves and center distance.

   i. Belt size and quantity.

   j. Static pressure controls' final operating set points.

5. Pump Test Forms: Submit pump curve showing design-, operating-, and no-flow points of operation. Also, record the following items on each pump test form:

   a. Manufacturer, size and serial number.

   b. All design and manufacturer's rated data.

   c. Pump operating suction and discharge pressure and final total dynamic head.

   d. No flow (pump discharge valve closed) suction and discharge pressure and corresponding total dynamic head. This procedure is to determine actual impeller size.

   e. Rated and actual operating current, voltage, and brake horsepower of each pump motor.

6. Chiller Test Forms: Record the following items for each chiller:

    a. Manufacturer, model number and serial number.

    b. All design and manufacturers' rated data.

    c. Rated and actual pressure drop across evaporators and condensers and related GPM.

    d. Entering and leaving water temperatures.

    e. Rated and actual operating current and voltage.

7. Heating and cooling-coil test forms: Record the following items on each test form:

    a. Manufacturer.

    b. All design and manufacturers' rated data.

    c. Rated and actual water pressure drop through each coil and related GPM.

    d. Rated and actual static pressure drop across each coil.

    e. Entering and leaving water temperatures.

    f. Wet-bulb and dry-bulb temperatures entering and leaving each cooling coil; dry-bulb temperatures entering and leaving each heating coil.

8. Electric Heating Coil/Duct Heater test forms: Test and record the following on each electric-heating-coil test form:

    a. Manufacturer and model number.

    b. All design and manufacturer rated data.

    c. Actual operating current and voltage.

    d. Coil location and identification number.

9. Boiler test forms: Record the following items on each boiler test form:

    a. Manufacturer and model number.

    b. All design and manufacturers' rated data.

    c. Service and location.

    d. Actual pressure drop and related GPM.

    e. Entering and leaving temperatures.

    f. Temperature control setting.

10. Test and balance drawings: Include the following:

    a. Terminal Units: Indicate mark, design maximum airflow, actual maximum airflow, minimum design airflow and minimum actual airflow.

    b. All air devices: Indicate terminal unit as air handler served from design airflow, actual airflow, neck size and air device type.

    c. Air Handlers: Indicate mark, design supply airflow, actual supply airflow, design return airflow, actual return airflow, outside air design airflow and outside air actual airflow.

    d. Fans: Indicate mark, design airflow and actual airflow.

1.9 FINAL ACCEPTANCE:

A. Before Certificate of Final Payment is issued the TABA shall recheck, in the presence of the Owner's representative, Architect and Engineer, specific and random selections of data recorded in the certified test and balance report.

B. Points and areas for recheck shall be selected by the Engineer.

C. Measurements and test procedures shall be the same as the original test and balance.

D. Selections for recheck, specific plus random, shall not normally exceed 15 percent of the total number tabulated in the report, except where special air systems require a complete recheck for safety reasons.

E. If random tests demonstrate a measured flow deviation of 10 percent or more from that recorded in the certified test and balance report, the report shall automatically be rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, a new certified test and balance report submitted, and a new inspection test made, all at no additional cost to the Owner.

1.10 OPPOSITE SEASON TEST:

A. The TABA shall perform an inspection of the HVAC system during the opposite season from that in which the initial adjustments were made. The balancing agency shall make any necessary modifications to the initial adjustments to produce optimum system operation.

END OF SECTION

SECTION 23 8000

CONVENTIONAL AUTOMATIC CONTROLS

PART 1 - GENERAL

1.1 SCOPE:

A. Section 23 0500 – "General Provisions – HVAC" shall apply to and become part of this Section.

1.2 CONTROL SYSTEMS:

A. Control equipment, except for items comprising an integral part of the water or refrigeration piping, shall be installed by trained mechanics employed by the control manufacturer.

B. Provide permanent nameplates for control switches and motor starters. Nameplates: engraved laminated plastic with letters legible under normal operating conditions. (Black on white).

C. Permanently identify control devices and room thermostats, so they may be identified on control diagrams. Provide engraved plastic nameplates for items mounted outside of or on faces of panels. Mark other instruments with indelible ink.

1.3 CONTROL WIRING:

A. Include all control and interlock wiring and power wiring for control panel in this Section. Install all control and interlock wiring in EMT. EMT and EMT fittings shall comply with the provisions of Electrical Work. **Plenum-rated communication wiring shall be allowed in lieu of conduit only when installed concealed above accessible ceilings (such as above lay-in ceilings) and shall be supported by cable tray or j-hooks on intervals not to exceed 5'-0" on center in accordance with Division 26 Specifications.**

B. Waterproof and firestop all conduit floor penetrations. Firestop conduit penetrations of fire rated walls and partitions.

C. Wire all devices individually to terminal strips in control panels.

D. Furnish necessary relays and auxiliary contactors and other accessories required. Provide interlock relays per N.E.C. Coordinate start-stop stations, auxiliary contacts, etc., with supplier of Starters and Motor Control Centers specified in Electrical Work.

END OF SECTION

SECTION 23 8100

DIRECT DIGITAL CONTROL

PART 1 - GENERAL

1.1 PROVISIONS OF DIVISION 23:

A. Section 23 0500 - "General Provisions, HVAC" shall apply to and become part of this Section.

1.2 PROVISIONS OF DIVISION 26:

A. "General Provisions, Electrical" shall apply to this Section.

1.3 SYSTEM DESCRIPTION:

A. Provide a Trane Summit automatic control system to match the Trane Summit Campus Wide BAS consisting of one or more distributed direct digital control processors (DCP) with provisions for bus connection to a central computer. DCP's shall be microprocessor based and strategically located at data concentration points or in close proximity to the end devices to be monitored and/or controlled. The DCP's shall include stand alone capability of direct digital control with integrated energy management programs including duty cycling, demand, optimum start and analog load reset.

B. The central computer (CC) located at the building shall include an operator's console with display, keyboard and printer. Central software shall include historical data storage, logging and retrieval, upline and downline loading of stored DCP programs, CC and DCP programming software, data logging of analog and digital values and color dynamic graphic software (mouse driven). Alarms and logical groups shall have alphanumeric points and group descriptors.

C. Provide all sensors, actuators, transducers, DCP's and other equipment to meet functional description.

D. Control equipment, except for items comprising an integral part of the water or refrigeration piping, shall be installed by trained mechanics employed by the control manufacturer.

E. Use standard components, regularly manufactured and not custom designed for project. Use systems and components proven in use.

F. System shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.

1.4 WORK REQUIRED:

A. All engineering design, labor, materials, equipment and services necessary for and reasonably incidental to proper completion of control work as shown or herein specified (excepting only work or materials specified or noted as being done or furnished by others), consisting in general of the following, complete and ready for operation.

1. Central Control (CC)
2. Distributed Control Panels (DCP)
3. Software packages
4. Remote control, alarm and sensing devices
5. Fire alarm system interconnects
6. Interface with Power Company meter.
7. Complete wiring network interconnecting all parts of the system
8. Interface with Campus Wide BAS
9. Instruction of Owner's operating personnel
10. Service contract

1.5 SUBMITTALS:

A. Within 30 days of notice to proceed and prior to installation of any equipment, the control contractor shall provide 6 copies of submittals for approval. Submittals shall include:

1. A complete system block diagram showing all computers, peripherals, power connections and source, plan of equipment in main control room, trunk wiring links, DCP's and location, and a listing of all points and systems connected to each DCP.
2. Complete operating sequences for all programs provided for HVAC equipment, boilers and chillers.
3. Specification data sheets for each piece of central and remote hardware, for software application package and for central programs and system services software.
4. Proposed site-unique menu tree showing the English descriptor proposed for each logical system and the English description of each logical data point within each system.
5. Menu map of all definition process menu paths showing all elements of menu prompts specified for system definition and user applications.
6. Samples of all specified reports, logs, and printouts showing compliance with all requirements for English code-free outputs.
7. Location of all control panels by room name and number.

8. Thirty days after approval of all above submittal data, submit typed copies of all system control sequences.

1.6 ACCEPTANCE PROCEDURES:

A. Upon completion, the contractor shall conduct a complete functional test of the system for the owner, architect, and engineer. Contractor shall simulate power failure recovery, and stand alone operation capability on communication loss with Central Control.

B. Provide 3 full sets of as-built drawings, complete operating manuals and hardware and software documentation.

1.7 WARRANTY SERVICE:

A. All components, software, parts and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship for one year from acceptance date.

B. Labor to trouble shoot, repair or replace system components shall be furnished at no charge to the owner during the warranty period.

1.8 MAINTENANCE:

A. The DDC manufacturer shall have a local branch office within 100 miles of the installation staffed with trained, full-time employees capable of performing testing, inspection, repair and maintenance services for the life of the system.

B. The mean time to repair once the DDC manufacturer's service representative is at the job site with the required parts shall not exceed two hours.

1.9 SYSTEM COMMISSIONING:

A. The Contractor shall completely checkout, calibrate and test all hardware and software to insure that the system performs in accordance with the approved sequences of operation submitted.

B. Include the services of a full time control technician for calibrating and adjusting controls for the first 10 working days after Owner has occupied building.

C. Provide assistance to the Test and Balance Contractor during his review and testing of the Control Systems.

D. Provide assistance to the commissioning authority throughout the commissioning process. See Section 230500 “General Commissioning Requirements”.

1.10 OPERATOR TRAINING:

A. Contractor shall provide a minimum of two full day's instruction for the owner's operating personnel on system operation and routine maintenance procedures. The control manufacturer shall also provide four additional days of on-site instruction and assistance to the owner during the warranty period on a call basis. The owner shall schedule these days at least one week in advance and for intervals of no less than eight hours at a time. The four days is exclusive of necessary travel time. These sessions shall encompass all areas of the system as requested by the owner including troubleshooting, diagnostics and all levels of operation and software definition.

PART 2 - EQUIPMENT

2.1 GENERAL:

A. System components requiring line voltage inputs shall be designed and tested to operate satisfactorily and without damage at 10% above and 15% below nominal rated input voltage.

B. All transmission bus connected devices shall be such that loss of any single device shall not disrupt or interfere with communication to other devices on the bus. Loss of communication with the central control and command station shall not cause any DCP to halt operation or to cease to perform its intended function (i.e., each DCP shall continue to operate on a stand alone basis).

C. After power failure and upon a power restoration, the system shall provide automatic sequential restart of equipment based on current program time and program requirements without operator intervention.

2.2 CENTRAL CONTROL:

A. Central control shall include a computer, monitor, wireless keyboard and mouse, printer and software.

B. Computer shall be PC compatible with not less than 160 gigabyte hard drive, 3-1/2"-1.44 megabyte floppies, 48X 16XDVD+/-RW/48X CDROM, 1 GB DDR RAM, 2.0 GHZ microprocessor, 256 MB Video Card.

C. Monitor shall be 19” LCD color monitor with minimum 1280 x 1024 resolution.

D. Printer: 8-1/2” x 11” color laserjet.

E. Central control equipment shall be equipped with a power supply with filtered AC input, surge protection, battery backup and shall be installed on-site at a location directed by Owner.

2.3 DISTRIBUTED DIRECT DIGITAL CONTROL PROCESSORS (DCP'S):

A. To prevent a single-failure catastrophe, multiple direct digital controllers shall be provided. Failure of any single controller shall have no effect on other controllers.

B. Direct digital controllers shall be microprocessor-based with all hardware, software, and communications interfaces. DCP's shall be capable of stand-alone operation, and incorporation into larger systems. The controllers shall be either 16 bit, or multiple 8 bit microprocessors configured so that input-output processing and operator command processing may be offloaded separately from the control processing. If the DCP's use digital communication to remote "slave" gathering panels, all such communication circuits extending outside the DCP shall utilize dual (redundant) bus cabling, be supervised, and provided with an auto-failover feature.

C. The controller shall be factory mounted and wired in a steel enclosure complete with all relays, digital to analog converters, and terminal strips. Controllers shall be expandable to 15% points of each type (analog and digital input and output) in excess of those actually required for this project.

D. The controller shall operate within the following limits:

1. Temperature 33 to 122°F.

2. Humidity 0 to 95% RH (non-condensing)

3. Voltage 24 VAC + 10% to -15% 50 or 60 HZ.

E. The controllers shall withstand storage conditions as follows:

1. Temperature -4 to 176°F.

2. Humidity 0-95% RH (non-condensing)

F. Local Diagnostics and Programming:

1. Each DCP shall be equipped to provide local diagnostics and adjustments either through a built-in digital display and keyboard to show such information as time and date, analog variables, binary conditions, system operation modes, critical alarms and operator definable functions to allow the operator to analyze and adjust the system being controlled or through a portable hand held operator's terminal.

2. Adjustments shall include but not be limited to proportional gain, integral rate, velocity and acceleration constants associated with incremental control and on/off values of two-position control.

3. The DCP shall be fully field programmable with the following built-in functions:

a. All closed loop control functions (P, PI, PID, incremental, floating, two-position, etc.)

b. All energy management functions

G. The system shall utilize PROM and RAM memory. All DDC algorithms and parameters shall be RAM based for ready access for modification and adjustment. RAM memory shall be provided with 100 hours battery backup minimum.

H. The controller software shall include a complete operating system, standard energy management application packages, standard control algorithm application packages, and an owner/user custom control and calculation application package complete with interpreter. Complete user documentation modules shall be provided.

I. DCP's shall be capable of being programmed to utilize stored default values for assured fail safe operation of critical processes. Default values shall be invoked upon sensor failure or if the primary value is normally provided by (the CC or) another DCP, or by loss of bus communication. Individual application software packages shall also be structured to assume a fail safe condition upon loss of input sensors. Loss of an input sensor shall result in output of a "sensor failed" message at the central control and command station.

J. The operating system software shall be PROM resident and operate independently of any central computer. The operating system shall control communications between the central terminal and the controllers and I/0 modules, provide alarm monitoring and reporting, provide control application packages, and contain built-in diagnostic routines.

K. The controller shall have memory error checking. Upon detection of a memory error, the CPU shall correct the error or halt to prevent erroneous operation. All "halts" shall report as an alarm at the central control terminal.

L. After a power failure and upon a power restoration, the system shall provide automatic sequential restart of equipment based on current program time and program requirements without operator invention.

M. Controllers shall accept industrial platinum and resistance sensors. Each output point shall be provided with an L.E.D. which shall indicate status of digital outputs and value (via variable intensity) of analog outputs. Processor software shall allow for scaling and for calibration of sensor lead length variations to ensure display accuracies.

2.4 SOFTWARE:

A. Software shall include the following:

1. System access limitation with 3 levels of access (operation only; operation plus programming; operation, operation plus programming and assigning individual passwords and authorization levels).

2. Psychometric routines.

3. Alarm lockout.

4. Floating alarm limits.

5. Time delay start sequence.

6. Time of day.

7. Optimum start-stop.

8. Air economizer initiation.

9. Chiller plant optimization.

10. Communication with chilled water system controller (see "Water Chillers" Section 235000).

11. DDC programs as required.

12. Event initiated programs.

13. DCP programming (from CC and DCP).

14. Data logging.

15. Status logging (all points).

2.5 TRANSMISSION NETWORK:

A. Communications between controllers shall have a system line capability of at least 3300 feet, or systems shall be equipped with modems.

B. Transmission line shall be electrically isolated from the DCP's and operator's terminal by optical couplers at each interface to prevent any voltages in the transmission lines from damaging any of the electronic circuits.

2.6 CONTROL WIRING:

A. Include all control and interlock wiring and power wiring for DCP's and control panel in this Section. Install in conduit in accordance with provisions of Electrical Work. **Plenum-rated communication wiring shall be allowed in lieu of conduit only when installed concealed above accessible ceilings (such as above lay-in ceilings) and shall be supported by cable tray or j-hooks on intervals not to exceed 5'-0" on center in accordance with Division 26 Specifications.**

B. Waterproof and firestop all conduit floor penetrations. Firestop conduit penetrations of fire rated walls and partitions.

C. Wire all devices individually to terminal strips in control panels.

D. Furnish necessary relays and auxiliary contacts and other accessories required. Provide interlock relays per N.E.C. Coordinate start-stop stations, auxiliary contacts, etc., with supplier of Starters and Motor Control Centers specified in Electrical Work.

2.7 CONTROL DEVICES:

A. Electronic Temperature Sensors: Temperature accuracy shall be as herein specified. Three (3) or four (4) wire shielded cable shall be utilized for all temperature sensing to reduce electrical noise.

1. Space Temperature sensors shall be RTD's, thermistors or solid state devices with a temperature range of 20 to 120 degrees F. The sensor shall be complete with a decorative cover and suitable for mounting at any angle over a standard electrical utility box.

2. Duct Temperature sensors shall be RTD devices or thermistors with an insertion measuring probe 18 inches long with a temperature range of 20 to 120 degrees F. The sensor shall include a utility box and gasket to prevent air leakage and vibration noise. For all mixed air and preheat air applications, install bendable averaging duct sensors with a minimum 12 foot long sensor element.

3. Liquid Immersion Temperature sensors shall be RTD or thermistor devices for all hot and chilled water temperature applications. The temperature range shall be 32 to 212 degrees F. Provide brass thermowells and install sensor probe with heat conductive grease. Probe and sensor head shall be removable without breaking fluid seal. Install sensors in top of pipe for horizontal runs and at a positive slope on vertical runs to prevent condensation from flowing to sensor head.

4. Outside Air Temperature sensor shall be an RTD, thermistors or solid state device mounted in the outdoors where air flow occurs. The temperature range shall be -20 to 180 degrees F. Provide a sun shield and weatherproof assembly for mounting to 1/2 inch rigid conduit.

B. Humidity Sensors: Space and return air relative humidity sensors shall be a wall or duct mounted devices that produce a linear output for the complete range of 0 to 100% RH. A thin film polymer sensing element shall respond quickly to humidity changes and shall be protected from contamination by a sintered filter. The sensor shall be factory calibrated with field periodic re-calibration capability. The room sensor shall have a decorative cover and mount to an electrical utility box. Accuracy of measurement shall be +2% for 0-80% RH at 68 degrees F, +3% for 80-100% RH.

C. Thermometers: Pipe line thermometers are specified in another section. Install dial thermometers in ducts where shown on control diagrams, providing averaging bulbs where shown.

D. Control Valves:

1. 125 psig WP with plug and disc inner valve to ensure modulation of flow where required. Valves 2" and smaller: all brass screwed or flared. Valves 2-1/2" and larger: flanged iron bodies and brass trim. Equip all valves with operators of sufficient power to ensure tightness against pressure. Control valves operating with inlet steam pressure greater than 15 psig shall have stainless steel trim and renewable seats.

2. Control valves shall be sized by the manufacturer of the control valve, based on actual capacity of equipment to be installed, and according to American National Standards Institute/Instrument Society of American Standard S75.01, "Control Valve Sizing Equations". Sizing data shall be submitted to Architect for review and acceptance.

3. Control valves shall shut tight against 50 psig differential or inlet pressure.

E. Freezestats: Manual reset, pneumatic not permitted. Locate freezestat bulbs between preheat and chilled water coils in units with chilled water coils and downstream from DX coils in units with DX coils.

F. Firestats: Single pole double throw, electric, manual reset, pneumatic not permitted. Firestats shown to be connected to the fire alarm system: compatible with fire alarm system, furnished and installed under Controls, wired under Electrical Work.

G. Flow Switches: Vaporproof enclosures, McDonnell & Miller. Pneumatic not permitted.

H. Valve & Damper Operators: Of sufficient power to close/open valves and dampers under operating conditions. Electric valve and damper motors shall have oil immersed gear trains and spring return to normal position. Valves shall close bubble tight at 100 psig.

1. Damper Operators: Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide proportional damper control with an input signal of 2 to 10 VDC. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall have a manual positioning mechanism and control direction of rotation switch accessible on its cover. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected for position feedback or master-slave applications. If required, 2 SPDT auxiliary switches shall be provided with one switch having the capability of being adjustable. Actuators with switches shall be constructed so an electrical ground connection is not required to meet agency listings. Actuators shall be UL listed and CSA certified, have a 2 year warranty, and be manufactured under ISO 9001 International Quality Control Standards.

2. Valve Operators (Small Valves): Actuators shall be fully modulating, floating (tri-state), two position, spring return, or 0-135 ohm slide wire as indicated in the control sequence. Fail safe where specified shall require either mechanical spring return, or battery back-up located near the building automation control panel for ease of maintenance. Capacitor type units within the individual actuators are not acceptable.

   Modulating valves shall be positive positioning, responding to a 2-10 VDC or 4-20 mA signal (with the addition of a 500 ohm resistor). There shall be a visual valve position indicator and an actuator generated 2-10 VDC valve position output signal for electronic feedback to the control panel. The actuator shall have the capability of adding auxiliary switches or feedback potentiometer if required. Powering shall be either by 24 VAC, 24 VDC, or 120 VAC, and power consumption shall not exceed 8 watts at 24 VAC. A 3 foot cable shall be provided for easy installation to an electrical junction box.

   The actuator shall provide minimum torque required for proper valve close-off. The actuator shall be designed with a current limiting motor protection or shall have adjustable single pole double throw travel stop limit switches. A release button or handle on the motor shall be provided to allow for manual override, except when utilizing spring return actuators.

   All valves shall have a minimum resolution of 250 to 1.

   The actuators shall be UL listed. The manufacturer shall warranty the actuator/valve assemblies for a period of 2 years from date of installation not exceeding 30 months from date of original shipment.

3. Valve Operator (Large): Actuator shall be modulating, floating (tri-state), two position, spring return, or 0-135 ohm slide wire as indicated in the control sequence. Fail safe where specified, shall require either mechanical spring return, or battery back-up located near the building automation control panel for ease of maintenance. Note: Battery back-up or capacitor type units within the individual actuators are not acceptable.

   Modulating valves shall be positive positioning, responding to a 0-10 VDC or 4-20 mA signal (with the addition of a 500 ohm resistor). There shall be a visual valve position indictor and an actuator generated 2-10 VDC valve position output signal for electronic feedback to the control panel. The actuator shall have the capability of adding auxiliary switches or feedback potentiometers if required. Powering shall be either by 120 VAC, 24 VAC or 24 VDC, and power consumption shall not exceed 8 watts at 24 VAC. A three foot cable shall be provided for easy installation to an electrical junction box.

   The actuator shall provide the minimum torque required for proper valve close-off, with an approximate running time of 2 minutes for full stroke. The actuator shall have the capability of adding auxiliary switches or feedback potentiometers if required. Powering shall be either by 120 VAC, 24 VAC or 24 VDC, and power consumption shall not exceed 8 watts at 24 VAC. A three foot cable shall be provided for easy installation to an electrical junction box.

   The actuator shall provide the minimum torque required for proper valve close-off, with an approximate running time of 2 minutes for full stroke. The actuator shall be designed with current limiting motor protection. End of travel switches are not acceptable. A release button on the actuator shall be provided to allow for manual override, except when utilizing spring return actuators.

   All valves shall have a minimum resolution of 40 to 1.

   All actuators shall be UL listed. The manufacturer shall warranty all actuator/valve assemblies for a period of 2 years from date of installation not exceeding 30 months from date of original shipment.

I. Static pressure measurement stations shall be fixed static rakes together with air straightening devices, all factory mounted in galvanized steel housings not lighter than 20 gauge. Maximum static pressure drop through static pressure measurement station 0.04" WG at 1000 FPM face velocity. (Install an access door in duct immediately upstream from each air flow measuring station.)

J. Air flow measurement stations shall be fixed pitot-static rakes together with air straightening devices, all factory mounted in galvanized steel housings not lighter than 20 gauge. Maximum static pressure drop through air measurement station 0.04" WG at 1000 FPM face velocity. For each air flow measurement station provide a cfm calibrated panel mounted magnehelic gauge. (Install an access door in duct immediately upstream from each air flow measuring station.)

K. Velocity Pressure Transducers 0 to 5 volts DC, accuracy $\pm$ 2% full scale, return air range (0 to 0.25" WG), supply air range 0 to 0.5", Setra or equal.

L. Wells: install pipe line mounted control and indicating devices in stainless steel or brass thermometer wells.

M. Capillary Supports: securely support all duct-mounted and casing-mounted thermostat capillaries using factory fabricated copper bulb supports.

N. Provide stand-offs for control devices mounted on externally insulated ducts and equipment.

O. Anchor all items mounted on gypsum board (dry-wall) using toggle bolts or moly bolts, not expansion shields.

P. Provide permanent nameplates for control switches and motor starters. Nameplates: engraved laminated plastic with letters legible under normal operating conditions. (White on black).

Q. Permanently identify control devices and room thermostats, so they may be identified on control diagrams. Provide engraved plastic nameplates for items mounted outside of or on faces of panels. Mark other instruments with indelible ink. Mark room thermostats and room temperature sensors on inside of covers.

R. Automatic Dampers:

1. Automatic dampers shall have extruded aluminum air-foil blades and all linkages shall be located outside of the airstream. Such dampers shall have leakage rates not exceeding 1% of Maximum Design Flow at 4" WG pressure differential.

2. Saw-mark ends of damper rods parallel to blades.

S. Turbine Flow Meter: Insertion type flow meters, impedance sensing, non-magnetic, non-photoelectric, volumetric accuracy ± 2% of reading over middle 80% of operating range. Pressure drop maximum 1 psi at 1100 FPM in 1-1/2" pipe. Operating pressure 400 psi, maximum temperature 200°F continuous, supply voltage 24 VDC at 50mA. DC Linearity 0.1% of span, 0-10 V or 4-20mA output. Onicon incorporated or approved equal.

T. Flow Metering Station:

1. Flow metering station shall be continuous monitoring Balance Master "window seal" in-line flow station or approved equal.

2. Flow meter shall be non-invasive ultra sonic transit-time flow meter powered by 115/1/60. Isolated outputs shall be 4-20 Ma and 5 volt unfactored pulses proportioned to flow rate.

3. Flow meter shall be housed in a Nema 4X enclosure for wall mounting and shall be capable of reading flow velocity over a range of 1-30 ft./sec. with an accuracy of 1% of reading.

2.8 CONTROL DEVICE APPLICATIONS:

A. Pump Status: Current transformers.

B. Fan Status: Differential static pressure switches.

C. Level alarms: External float switches for closed vessels, open floats for open tanks.

PART 3 - CONTROL SEQUENCES:

3.1 GENERAL:

A. Control diagrams on drawings are intended to indicate, in general, control arrangements. Provide all instruments, relays, operators, switches, etc. required to accomplish control sequences whether or not such devices are actually shown on control diagrams.

B. As shown on drawings.

END OF SECTION

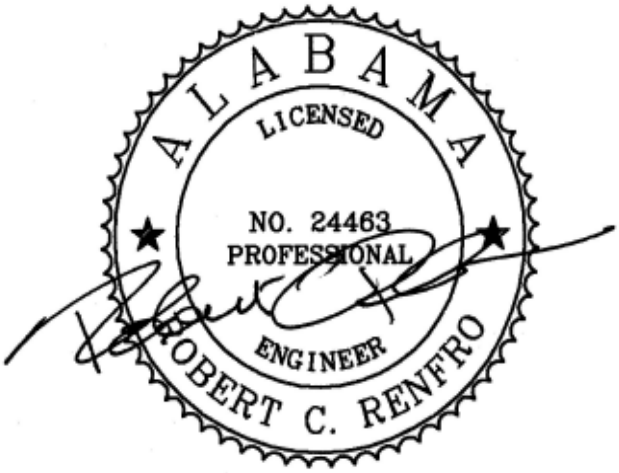
SECTION 26 00 00

COVER - RCR

DIVISION 26/27/28

ELECTRICAL SPECIFICATIONS

PREPARED BY



3/19/2026

SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. General Conditions:
1. The accompanying General Conditions (front-end specifications) shall apply to and form a part of this section.

B. General Requirements:
1. Carefully examine General Conditions, other specification sections, and other drawings (in addition to Electrical) in order to be fully acquainted with their effect on electrical work.
2. Do all work in compliance with all applicable codes, laws, and ordinances, the National Electrical Safety Code, the National Electrical Code (hereinafter referred to as "Code"), applicable energy codes, and the regulations of the local utility companies. Obtain and pay for any and all required permits, inspections, certificates of inspections and approval, and the like.
3. Cooperate with other trades and contractors at job. Perform work in such manner and at such times as not to delay work of other trades. Complete all work as soon as the structure and installations of equipment will permit. Patch, in a satisfactory manner and by the proper craft, any work damaged by electrical workmen.

C. Electrical Contractor Experience Requirements:
1. Electrical contracting firm shall be licensed as an electrical contractor in the state where work will be performed.

1.2 GENERAL SCOPE OF ELECTRICAL WORK (REFER TO DRAWINGS FOR OTHER SPECIFIC SCOPE ITEMS)

A. Furnish all labor and materials to complete electrical work as shown on drawings and/or herein specified.

B. Remove all existing electrical equipment and wiring made obsolete by this project and remove or relocate all electrical 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. Dispose of salvageable materials as directed by the Architect. Contractor shall schedule meeting to review scope of electrical demolition and to confirm scope and phasing of proposed demolition with the owner in the presence of the prime consultant prior to start of any electrical demolition.

C. Furnish and install complete power, telephone and other electrical services as shown on drawings and/or specified herein.

D. Pay all electrical utility company service charges (if any) in connection therewith, including permanent meter deposit. Meter deposits will be refunded to Contractor at time of Owner's acceptance.

E. Furnish and install complete power distribution system as shown on drawings and/or specified

herein.

F. Furnish and install disconnect switches for motors as shown on drawings and/or specified herein.

G. Furnish and install complete electrical grounding systems as shown on drawings and/or specified herein.

H. Install and connect electrical equipment mentioned in Division 26/27/28 Specifications or noted in drawings, whether furnished by electrical contractor or by others.
1. Where shown or specified, equipment furnished by others shall be installed and connected under this Contract.
2. Where shown or specified, Contractor shall receive, unpack, check and assume custody of equipment furnished by Others. Contractor shall assume responsibility for care and safekeeping of this equipment, when delivered into his custody. He shall protect it from moisture, dust and damage during construction and until Owner acceptance of project.

I. Furnish and install complete electrical lighting systems as shown on drawings and/or specified herein.

J. Furnish and install all electrical items shown on drawings and/or herein specified, unless shown or specified otherwise.

K. Furnish and install complete controls & auxiliary systems as shown on drawings and/or specified herein.

L. Furnish and install complete telephone/data raceway (including all outlet boxes, face plates, conduit raceways, telephone backboards, terminal cabinets, etc.), wiring and devices system as shown on drawings and/or specified herein.

M. Furnish and install a complete Fire Alarm System as shown on drawings and/or specified herein.

N. Furnish and install a complete Surge Protection System as shown on drawings and/or specified herein.

O. Procure and pay for permits and certificates as required by local and state ordinances and fire underwriter's certificate of inspection.

P. Balance loads as equally as practicable on services, distribution feeders, circuits and buses. Provide typewritten directory for each panel.

Q. Unless specifically indicated or required otherwise, terminate all circuitry/cabling provided within this contract at associated equipment/devices/etc. in accordance with all applicable codes, standards and supplier requirements, whether associated equipment/device/etc. is furnished within this contract or by others.

R. Complete field testing, adjustment & startup of all systems listed above as shown on drawings and/or specified herein.

PART 2 - PRODUCTS

2.1 APPROVED MATERIALS AND DEVICES

A. Where not otherwise specified, provide only new, standard, first-grade materials/systems throughout, conforming to standards established by Underwriter's Laboratories, Inc., and so marked or labeled, together with manufacturer's brand or trademark. All equipment/systems subject to approval of Architect before installation. All like items and associated equipment/systems shall be of one manufacturer.

B. To ensure proper coordination, it is intended that all electrical equipment and materials specified in Division 26/27/28 of these specifications and shown on the electrical drawings be furnished and installed by the electrical sub-contractor, for proper coordination. It will not be permissible for any of these items to be furnished directly by the general contractor.

2.2 SUBMITTALS

A. All submittals to the design team shall be accompanied by a letter summarizing all proposed deviations from specified products or pre-approved substitutions. The absence of such a letter shall be understood to indicate that the contractor intends to meet all contract requirements, regardless of cut-sheets/data-sheets provided within the submittal.

B. Submit to Architect ten (10) days prior to bid date three (3) copies of any items and/or manufacturers which are proposed as substitutes for those specified.

C. Submit to Architect promptly after award of Contract and prior to purchasing, the number of copies required by the contract. All drawings of a specific item or system shall be made in one submittal, and within thirty (30) days after award of Contract. Shop drawings of all power equipment shall contain exact details of device placement, phasing and numbering, in form of elevations, for each major piece of equipment. Shop drawings shall be submitted on the following:

1. ALL POWER DISTRIBUTION EQUIPMENT (i.e. SWITCHBOARDS, PANELBOARDS, DRY TYPE TRANSFORMER, ETC.)
2. ALL ELECTRICAL AND TELECOMMUNICATION EQUIPMENT LAYOUTS - Submittals shall include ¼" = 1'-0" CAD drawings (hand drawn sketches will not be accepted) of each electrical room, IT room, electrical equipment stand, generator area, or any other similar area with electrical equipment. Drawings shall indicate all panelboards, transformers, switchboards, generators, equipment racks, control panels, HVAC equipment, etc. that are located in each electrical/IT area. Layouts shall show that each piece of electrical equipment has the clearances, working space and dedicated equipment space required by applicable codes. No conduits to equipment within these areas shall be installed until submittals have been provided and returned without exception by the design team.

D. The contractor shall fully review, comment upon and correct all shop drawings as required to assure compliance with contract documents prior to submittal to Architect. The failure of the contractor to properly review and correct shop drawings prior to submittal will result in rejection of shop drawings by the engineer. Review by the Architect will be for general conformance with contract documents. The contractor shall be fully responsible for correctness of all submitted dimensions, details, quantities and locations.

E. None of the above items shall be installed until shop drawings or catalog data have been reviewed by Architect without rejection or required resubmittal. Any listed item not submitted, even if specified, shall be considered not acceptable and shall be removed if directed.

F. Any required resubmittal will be reviewed by the Architect for conformance with previously issued comments only. The contractor shall be responsible for verifying that all items not specifically requiring resubmittal have not been altered from the previously reviewed submittal.

G. Material proposed for substitution shall be of the same quality, perform the same functions, conform to such physical dimensions and appearance as are required by the Architect. All material proposed for substitution is subject to the approval of the Architect and his authority for approval is final. No material proposed for substitution will be considered unless all submittal data complies with the drawings and specifications of Section 16 as to time of submission, number of copies of submittal, and detail requirements.

H. Samples of material shall be furnished where required by drawings or Division 26/27/28 Specification, or as requested by the Architect on items proposed as substitutes.

I. Submit to Architect a certificate of final inspection from local inspection department.

PART 3 - EXECUTION

3.1 SITE VISIT

A. The Contractor shall visit the site to determine existing dimensions and conditions affecting electrical work. Failure to do so in no way relieves Contractor of his responsibility under Contract.

3.2 CLEARANCE WITH UTILITIES

A. It shall be the responsibility of this Contractor, prior to bid, to reaffirm with the utility companies involved, that the locations, arrangement (and with power company voltage, phase, and metering required) and connections to utility service are in accordance with their regulations and requirements. If their requirements are at variance with these drawings and specifications, the Contract price shall include any additional cost necessary to meet those requirements without extra cost to Owner after a contract is entered into.

B. On many projects the utility company may levy charges due to locations, size or type service involved. The Contractor shall be responsible for these charges (including permanent meter deposit), unless such charges are not available prior to bid and Contractor so documents as described below. The meter deposit will be refunded to the contractor at time of Owner's acceptance.

C. Should above cost not be available, prior to bid, Contractor must submit a letter signed by a responsible utility company person so stating with his bid and in turn must be submitted by Prime Contractor with his bid to Owner. The cost will then be deleted from the Contract and become responsibility of the Owner.

D. The contractor shall be fully responsible for scheduling and coordinating all required utility company work with associated utility companies prior to start of work. Contractor shall be responsible for notifying the owner of any required utility company costs/fees, forms, contracts, etc. as required to keep the project on schedule as early as possible, and for providing necessary forms from utility company to owner for signing where necessary.

E. Arrange with utility companies for such services as shown or herein specified and installation of

meter where shown. Furnish with shop drawings a signed document from utility companies describing the location and type of services to be furnished and any requirements they may have. This document shall be signed for each utility company by a person responsible for granting such service.

3.3 WORKMANSHIP

A. All work shall be in accordance with the latest editions of NFPA 70 (National Electrical Code), NFPA 101 (Life Safety Code), National Electric Safety Code, International Building Code, applicable NECA standards and the rules and regulations of State and Local Authorities Having Jurisdiction.

B. All work shall be executed in a workmanlike manner and shall present a neat and mechanical appearance upon completion.

C. All equipment, devices, etc. shall be installed in accordance with manufacturer's recommendations.

D. All items shall be installed straight and plumb in a workmanlike manner and care shall be exercised so that like items are mounted the same position, heights and general location.

E. Keep site clean of accumulation of cartons, trash and debris.

3.4 SAFETY

A. The contractor is solely responsible for all job safety. Architect assumes no responsibility for job safety. Maximum consideration shall be given to job safety and only such methods as will reasonably ensure the safety of all persons shall be employed. The codes and regulations of OSHA shall be given strict compliance as well as such other codes, laws, and regulations as may be applicable.

3.5 CONTRACT DOCUMENTS

A. Contract documents indicate diagrammatically, extent, general character and approximate location of work. Where work is indicated but minor details omitted, furnish and install it complete so as to perform its intended functions. For details and mechanical equipment, follow drawings provided by other disciplines (Architectural, Mechanical, Structural, Civil, etc.) and fit electrical work thereto.

B. Contract documents consist only of the hardcopy documents issued by the Prime Architect. Electronic documents issued directly by the electrical engineer to the contractor and/or its sub-contractors/vendors are issued for convenience only (electronic documents are not formal contract documents).

C. If the contractor and/or one of its suppliers require a one-time transfer of electronic files of the current electrical construction documents to prepare shop drawings (or for another similar purpose), it shall:
1. Sign a waiver prepared by the electrical engineer prior to the transmittal of these files.
2. Agree to pay the electrical engineer a fee of $50.00 per drawing, up to a maximum of $400 per transfer, payable upon receipt of the files.

3. To the fullest extent permitted by law, indemnify, hold harmless, and defend JRA from all claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the use of the CAD files.

D. Take finish dimensions at job in preference to scaled dimensions.

E. Except as above noted, make no changes in or deviations from work as shown or specified except on written order of Architect.

3.6 UNDERGROUND UTILITY/EQUIPMENT COORDINATION

A. Prior to commencement of work, verify exact locations of all existing or proposed underground utilities and/or underground equipment and verify that proposed electrical installation does not conflict with these items. Notify Architect immediately if any conflict is found.

3.7 EQUIPMENT STORAGE

A. Store all electrical equipment in dry, covered locations as directed by equipment manufacturers. Contractor shall be responsible for replacing or repairing improperly-stored equipment as directed by Architect.

3.8 EXCAVATION, CUTTING AND PATCHING

A. Perform all cutting and excavating as necessary for installation of electrical systems, unless specifically covered under another section. After Architect's observation, complete all excavation, filling and backfilling as directed under specifications for preparation of site and earthwork. Foundations for equipment shall be as specified under concrete section. Concrete pads shall be minimum of 6" thick; unless greater thickness required by equipment manufacturer. Obtain specific approval of Architect before cutting into any structural members.

B. For all such work employ competent workmen, and finish up in neat and workmanlike manner, equal to quality and appearance to adjacent work.

3.9 PENETRATIONS

A. All penetrations in water tight barriers shall be made so that barrier rating is not compromised. Furnish roof flashing for all equipment installed under Division 26/27/28 that penetrates through the roof. Appropriate flashing is specified under roofing and sheet metal section. Supply these flashings for installation under roofing and sheet metal section.

B. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly to maintain the fire/smoke rating of the associated membrane.

C. Where penetrations are required through structural elements, verify penetration locations and sizes with structural engineer. In no case shall the structural integrity be compromised without written approval from structural engineer.

3.10 INSTALLATION OF EQUIPMENT - GENERAL

A. Care shall be exercised in exact routing and location of all items so as not to obstruct access to equipment, personnel walkways, or expose it to potential mechanical damage.

B. Items shall be securely anchored and/or fastened. Provide proper support for all equipment,

devices, conduits, boxes, panels, etc. as required by code and for a workmanlike installation. Provide guy wiring for wood poles where required to prevent leaning. All construction shall meet the seismic design requirements of the building code. Items (especially transformers, light fixtures, equipment racks, freestanding gear, etc.) installed in seismic zones C, D, E or F shall be supported and braced per applicable codes and standards.

C. All wall, pole or frame-mounted electrical equipment shall be mounted to metal unistrut (or similar) frames of same material as electrical equipment. For example, pole-mounted painted or galvanized steel disconnect switches shall be mounted to galvanized steel unistrut frames.

D. All electrical equipment, furnished by Contractor or by others shall be covered and protected during construction.

E. All control cabinets, panels, motor control centers and other electrical cabinets and enclosures shall have all trash removed and be vacuumed clean. All foreign paint, etc., shall be removed from exterior and all scratches in finish touched up with same color and material as original. Any rusted areas shall be sanded, primed and repainted.

F. All relays, starters, push-button and other control devices shall be cleaned and if necessary, lubricated with CRC 2-26 to assure free operation.

3.11 MOTORS, STARTERS AND CONTROLS

A. Unless otherwise specified or shown, all motors will be furnished and installed under other sections of this specification.

B. Electrical Contractor shall install all starters and all electrical power wiring and connections to motors and starters.

C. Unless otherwise specified or shown, all control items for motors shall be furnished, installed and wired in conduit under other divisions of this specification.

3.12 CIRCUITS AND BRANCH CIRCUITS

A. Outlets shall be connected to branch circuits as indicated on drawings by circuit numbers. No more outlets than are indicated shall be connected to a circuit.

B. Branch circuit homeruns shall be installed as shown on drawings. Multiple homerun conduits shall not be combined by contractor into larger, single homerun conduits unless specific permission is granted by the Engineer.

3.13 LUG/TERMINAL RATINGS

A. All lug/terminal ratings, sizes, locations, types, etc. shall be coordinated with the associated conductor sizes, types, routings, etc. by the contractor.

B. All lugs/terminals/etc. shall be rated for 75 degree C terminations (minimum, unless specified otherwise).

3.14 EQUIPMENT FAULT CURRENT RATINGS

A. All equipment and breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated distribution equipment. All interrupting ratings shall

be full ratings. Where new devices or breakers are added to existing distribution equipment, the new devices/breakers shall have interrupting ratings matching or exceeding that of the existing distribution equipment.

3.15 OUTLET LOCATION

A. Symbols shown on drawings and mounting heights indicated on drawings and in specifications are approximate only. The exact locations and mounting height must be determined on the job and it shall be the Contractor's responsibility to coordinate with other trades to ensure correct installation.

3.16 IDENTIFICATION

A. Each panel shall have each circuit identified. Panels without branch circuit nameplates shall have typewritten directories.

B. Each individually mounted switch, circuit breaker, starter and/or any other control or protective device shall identify equipment fed and fuse size, if any, by engraved plastic nameplate, white with black letters, screw attached.

C. See Specification Section 26 05 53 for additional requirements.

3.17 GROUNDING

A. All equipment shall be grounded and bonded in accordance with all state/local regulations, The National Electrical Code and as specified herein.

3.18 TELEPHONE WORK

A. Provide telephone raceways, outlets and backboards, as shown. Provide additional work as described in Specification Section 27 10 00 and/or shown on drawings. Bond all raceways together at backboards and provide No. 6 ground wire extending from raceway bonds to cold water pipe, in 1/2 inch raceway. Carefully ream ends of all raceways.

3.19 PAINTING

A. Refer to Painting/Finishing specifications for requirements regarding field painting of exposed conduit. Any scratches, dents or rust spots in conduit electrical enclosures, panels, motor control or any other electrical items shall have the dents removed, and they, along with any rust spots or scratches, sanded and touched up with the same exact color paint as original finish.

3.20 ACCEPTANCE TESTING

A. Upon completion of work, the entire electrical system installed within this project shall be tested and shall be shown to be in perfect working condition, in accordance with the intent of the specifications and drawings. It shall be the responsibility of the Electrical Contractor to have all systems ready for operation and to have an electrician available to operate same in accordance with and under the supervision of the observation representative(s) of the Architect. The Electrician shall be available to assist in removal of panel fronts, etc., to permit inspection as required.

3.21 OPERATION AND MAINTENANCE DATA

A. One set of marked "AS BUILT" drawings, three (3) sets of all equipment catalog and

maintenance data and three (3) sets of all final shop drawings, on all equipment requiring same shall be turned over to owner. These items shall be bound in hard back book. Contractor shall explain and demonstrate all systems to Owner's representative.

3.22 GUARANTY-WARRANTY

A. Furnish a written Guarantee-Warranty, countersigned and guaranteed by General Contractor, stating:
   1. That all work executed under this section will be free from defects of workmanship and materials for a period of one (1) year from date of final acceptance of this work.
   2. Above parties further agree that they will, at their own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the Guaranty-Warranty.

END OF SECTION 26 05 00

SECTION 26 05 19

POWER CONDUCTORS AND CABLES 51V-600V

PART 1 - GENERAL

1.1 DESCRIPTION

A. Power Wires and Cables

B. Low Voltage Wires and Cables

PART 2 - PRODUCTS

2.1 POWER WIRES AND CABLES - 600 VOLT

A. General: Conductors shall have current carrying capacities as per N.E.C. and with 600 volt insulation, #12 minimum except for controls and fixture wire. Conductors shall be copper.

B. General Application (see below for exceptions):
1. At or Below Grade (including within slab-on-grade):
   a. #8 or larger conductors:
      1) XHHW or RHH/RHW/USE stranded (in conduit).
   b. #10 or smaller conductors for circuits terminating at motors:
      1) THHN/THWN or XHHW stranded (in conduit).
   c. #10 or smaller conductors (excluding circuits terminating at motors):
      1) THHN/THWN or XHHW solid (in conduit).
2. Above Grade:
   a. #8 or larger conductors:
      1) THHN/THWN, XHHW or RHH/RHW/USE stranded (in conduit).
   b. #10 or smaller conductors for circuits terminating at motors:
      1) THHN/THWN, XHHW or RHH/RHW/USE stranded (in conduit).
   c. #10 or smaller conductors (excluding circuits terminating at motors):
      1) THHN/THWN, XHHW or RHH/RHW/USE solid (in conduit).
3. Power Wire and cable shall be as manufactured by Southwire, Rome, Encore Wire, American Insulated Wire, Okonite, Phelps-Dodge, Amercable, Aetna or approved equal.

C. Emergency Feeder Wiring
1. Where specifically required by NEC articles 700, 701, or other similar sections, feeder-circuit wiring for emergency systems and legally-required standby systems shall be a listed electrical circuit protective system consisting of 2-hour fire-rated, mineral insulated, copper-sheathed wiring cable (Pyrotenax System 1850 or equal).

D. Class 1 Control Cabling (120VAC Control Circuits, Etc.)
1. Unless specified otherwise, Class 1 control cabling shall:
   a. Be rated for exposed cable tray installation.
   b. Be plenum rated.
   c. Be UL-rated for the proposed application.
   d. Be multi-conductor with overall outer sheath as required by the application. The insulation of each conductor within the overall multi-conductor cable shall be uniquely color-coded. Ground conductors (when provided) within the multi-conductor cable

shall have green insulation. Conductors with green insulation shall not be used for conductors other than ground.
e. Utilize copper conductors.
f. Have wire gauge as required to limit voltage drop to acceptable limits determined by the system supplier and to meet all applicable code requirements.
g. Where installed underground, within slab-on-grade or in exterior locations, be rated for wet locations.
h. Where required for specific systems, meet the specific requirements (conductor quantity, wire gauge, insulation type, shielding, etc.) of the system supplier.
i. Be rated for 600V.
j. Be industrial grade.
k. Have stranded conductors.
l. Have sunlight/oil-resistant PVC/Nylon insulation and jacket with ripcord.

2. Control cabling shall be as manufactured by Belden, AlphaWire or General Cable.

E. Fixture Wiring
1. Conductor Types:
a. Type TFFN or XFF.
2. Minimum Sizes:
a. For fixtures up to 300 watts: #16.
b. For fixtures over 300 watts up to 1500 watts: #14.
c. For fixtures over 1500 watts: as required.
d. Conductors to concrete pour fixtures: #12.
3. Fixture wire shall extend only from fixture to first junction, and not over 6 feet, except for concrete pour units.

2.2 WIRE CONNECTIONS:

A. All connector types:
1. Shall be properly rated for the proposed application by UL and per the manufacturer.

B. At Motor Connections (within motor terminal boxes):
1. On Unshielded Wire:
a. Single conductor per phase: shall be made with insulated set screw connectors or 3M 5300 Series 1kV Motor Lead Connections kits with mechanical lugs as required.
b. Multiple conductors per phase: shall be made with insulated mechanical lugs, rated for the associated motor cable types, by Polaris or Ilsco.
2. On Shielded Power Wire:
a. The braided shields and internal grounding conductors of shielded power (not instrumentation) cables shall be grounded at BOTH ends (at VFD/starter and at motor) with a termination kit provided by the cable supplier. This termination kit shall include a connection ring that makes contact around the full circumference of the braided shield, and connects all internal grounds to a common external ground point.
3. Cabling within motor terminal boxes shall be trained such as to prevent any splice/termination/connection kits from contacting inside edge(s) of the motor terminal boxes (to prevent chaffing of the insulation/splice/wiring which could lead to faults). Contractor shall carefully coordinate all required motor terminal box sizes to ensure proper capacity for all required conductors/splices.

C. Other Dry locations:

1. On Wire larger than #10: shall be made with solderless, non-insulated compression-type connectors meeting requirements of Federal Specification WS-610e for Type II, Class 2 and shall be covered with Scotch #33 electrical tape so that insulation is equal to 150% of conductor insulation.
2. On Wire #10 and smaller: shall be made with one of the following:
   a. Ideal Wing Nuts or equal by 3M .
   b. Ideal Push-In Wire Connectors (for #12 and smaller only).

D. Other Wet/Damp locations:
1. On Wire larger than #10: shall be made with underground/direct-burial, waterproof rated EPDM or TPE-insulated connectors by Ilsco, Burndy or T&B.
2. On Wire #10 and smaller: shall be made with one of the following:
   a. Ideal Weatherproof or Underground Wire Connectors pre-filled with 100% silicone sealant as required by the application.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. All wires and cables shall be installed in conduit unless specifically noted otherwise.

B. All joints and splices on wire shall be made with solderless connectors, and covered so that insulation is equal to conductor insulation.

C. No splices shall be pulled into conduit.

D. No conductor shall be pulled until conduit is cleaned of all foreign matter.

E. Wire and cable shall be neatly formed, bundled and tied in all panelboards, wireways, disconnect switches, pullboxes, junction boxes, cabinets and other similar electrical enclosures.

F. All wires and cables installed in underground or other wet locations shall be rated by the manufacturer for wet locations.

G. Network cabling shall be continuous from endpoint to endpoint and shall not be spliced unless specifically noted otherwise.

H. All conductors/cabling (including spare conductors) shall be properly terminated unless specifically directed otherwise. See above for general termination hardware requirements.

3.2 POWER WIRE AND CABLE INSTALLATION:

A. No power conductor shall be smaller than #12 except where so designated on the drawings or hereinafter specified.

B. Multi-wire lighting branches shall be used as indicated.

C. Where more than three current-carrying conductors are installed in a single raceway or cable, conductors shall be derated as indicated in NEC Table 310.15(B)(3)(a).

D. Raceways/cables shall generally not be installed exposed to sunlight on roofs unless specifically required. Where raceways or cables are installed exposed to sunlight on roofs, conductors shall

be derated with ampacities adjusted per NEC Table 310.15(B)(3)(c).

E. In installing parallel power conductors, it is mandatory that all conductors making up the feeder be exactly the same length, the same size, the same type of conductor with the same insulation. Each group of conductors making up a phase or neutral must be bonded at both ends in an approved manner.

F. In installing overhead main power services, a minimum of 5'-0" of cable per run shall be extended beyond the weatherhead(s) for connection to service drop. Confirm exact requirements with local utility company.

3.3 WIRE CONNECTIONS

A. See Part 2 above for material types.

B. Aluminum Wire Connections:
1. Where aluminum wiring is allowed, connections shall utilize compression fittings, no exceptions (Anderson Versa Crimp or equal).

C. Any stranded wire connection to wiring devices shall be made with crimp type terminals.

D. All electrical connections and terminals shall be tightened according to manufacturer's published torque-tightening values with calibrated torque wrenches as required to clearly indicate final torque value to the contractor. Where manufacturer's torque values are not provided, those specified in UL 486A & 486B shall be used.

E. All connections and connector types shall be installed in strict compliance with all requirements of the connector manufacturer.

F. Under no condition shall the specified conductors be connected to terminals rated less than 75°C. Where conductors sized #1 or smaller are shown to be terminated at equipment and the terminals of that equipment are rated for less than 75°C, contractor shall install junction box near equipment to capture the specified conductors, splice with compression connections (rated for a least 75°C) and extend conductors with ampacity rating as required by NEC (based on terminal temperature rating) to equipment terminals. The length of the conductors to be terminated shall be as directed by the AHJ but not less than 48 inches.

3.4 LOW VOLTAGE (LESS THAN 50V) CONTROL AND NETWORK CABLE INSTALLATION:

A. All wires and cables shall be installed in conduit unless specifically noted otherwise. Low voltage control and/or network cabling located within concealed, accessible ceiling spaces (such as above lay-in ceilings) may be run without conduit if the following requirements are met:
1. Cabling shall be plenum-rated, multi-conductor.
2. Cabling shall be supported by cable tray or with J-hook supports on intervals not to exceed 5'-0" on center. Cabling shall be supported solely from the cable tray or j-hooks supported from the building structure, without using piping, ductwork, conduit or other items as supports.
3. Cabling shall be properly bundled with plenum-rated Velcro straps on intervals not to exceed 30" on center.
4. Properly-sized conduit(s) shall be provided wherever cabling enters an inaccessible or exposed area (such as above gyp board ceilings or through walls). End bushings shall be

provided on both ends of all raceway terminations. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly.

3.5 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.

3.6 LABELING AND COLOR CODING OF WIRE AND CABLE

A. Refer to Specification Section 26 05 53 for all labeling requirements.

B. A color coding system as listed below shall be followed throughout the network of branch power circuits as follows:

PHASE	120/208/240/ COLOR	120/240 HIGH LEG DELTA COLOR	277/480 VOLT COLOR
A	BLACK	BLACK	BROWN
B	RED	ORANGE (FOR HI-LEG)	ORANGE
C	BLUE	BLUE	YELLOW
NEUTRAL	WHITE	WHITE	GRAY
GROUND	GREEN	GREEN	GREEN

C. Where dedicated neutrals are installed for multi-wire branch circuits, the neutral conductors shall be color coded as follows:

PHASE	120/208/240/ COLOR	120/240 HIGH LEG DELTA COLOR	277/480 VOLT COLOR
NEUTRAL A	WHITE W/ BLACK TRACER	WHITE W/ BLACK TRACER	GRAY W/ BROWN TRACER
NEUTRAL B	WHITE W/ RED TRACER	WHITE W/ ORANGE TRACER (FOR HI-LEG NEUTRAL)	GRAY W/ ORANGE TRACER
NEUTRAL C	WHITE W/ BLUE TRACER	WHITE W/ BLUE TRACER	GRAY W/ YELLOW TRACER

D. Control Conductors: Shall be color coded by use of colored “tracers”. No control circuit shall contain two identical conductors. For example, a set of five (5) control conductors for a pushbutton station represents one (1) control circuit which would require five (5) uniquely-colored control conductors.

3.7 TESTING

A. The insulation resistance of all feeder conductors (feeding electrical distribution equipment such as switchboards, panelboards, transfer switches, transformers, etc.) shall be tested at the load side of the feeder breaker with a 1000-volt DC Megger Tester prior to energization or final termination. Any feeder conductor with an insulation resistance less than the recommended

minimums in the latest version of NETA Acceptance Testing Specification ("ATS") standard shall be replaced by the contractor at the contractor's expense. All final test results shall be clearly documented (with date, time, feeder, results, test equipment, etc.), and the final test results shall be submitted to the design team for review.

END OF SECTION 26 05 19

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 GENERAL

A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO GROUNDING OF THE FOLLOWING:
1. Service Equipment.
2. Transformers.
3. Non-current carrying conductive surfaces of equipment.
4. Metal Buildings.
5. Structures.
6. Other Equipment.

1.2 GENERAL REQUIREMENTS

A. All equipment, building steel, and main service shall be effectively and permanently grounded with a conductor cross section as required by the National Electrical Code and of capacity sufficient to ensure continued effectiveness of the ground connections for fault current. Ground conductors shall be as short and straight as possible, protected from mechanical injury and, if practicable, without splice or joint.

B. All grounding connections shall be installed in accordance with the National Electrical Code and all local codes and requirements. Such codes shall be considered minimum requirements and the installation of the grounding system shall ensure freedom from dangerous shock voltage exposure and provide a low impedance ground fault path to permit proper operation of overcurrent and ground fault protective devices.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. All grounding conductors shall be insulated with green colored, 600 volt insulation unless noted otherwise.

B. Motors having power supplied by single conductor wire in conduit shall be grounded through the conduit system. Flexible conduit shall be “jumpered” by an appropriate bonding conductor.

2.2 GROUNDING ELECTRODES

A. Grounding electrodes shall be copper-clad steel rods 3/4 inch in diameter and ten feet long. Where longer electrodes are necessary to reduce the ground resistance, Contractor shall provide sectional rods, connectors, drive heads, etc.

2.3 CONNECTIONS

A. All conductor-to-conductor, conductor-to-ground rod, conductor-to-structure, conductor-to-fence connections of #6 and larger sized conductors and underground ground connections shall be permanent exothermic welded connections (Cadweld or equal) unless otherwise noted on

applicable drawings.

B. Connections to equipment shall be by bolted compression type lugs (except for motors). When the conductor is #6 and larger, the lug shall be joined to the conductor by an exothermic weld (Cadweld or equal).

C. Motors to be grounded by the grounding conductors run with the power conductors shall have a split-post grounding stud installed in the connection box.

D. Each cast pull box or junction box shall have a ground lug, connected to largest ground conductor to enter box.

E. Ground connections at conduit terminations shall be made by approved grounding bushings (see Raceways Specification Section for additional requirements).

2.4 MANUFACTURERS

A. Conduit clamps and connectors shall be manufactured by Raco, OZ., or Ercon.

B. Lugs shall be as manufactured by Square “D”, Burndy, or T and B.

C. Exothermic weld connections shall be as manufactured by Cadweld, or approved equal.

D. Ground rods shall be as manufactured by Joslyn or McGraw Edison.

E. Split post grounding shall be as manufactured by Burndy or T and B.

PART 3 - EXECUTION

3.1 MAIN SERVICE GROUND

A. The main service grounding electrode system shall consist of the following items bonded together by the grounding electrode conductor:
1. The main underground cold water pipe (metal).
2. The metal frame of the building.
3. Driven ground rods. Ground rods shall be embedded at the lowest point in the building and below the permanent moisture level. Ground rods shall be spaced a minimum of ten (10) feet apart and connected in parallel until resistance to ground does not exceed five (5) ohms.

B. The grounding electrode system shall be connected to the grounded conductor (neutral) on the supply side of the service disconnecting means by a grounding electrode conductor not smaller than that shown in Table 250.66 of the N.E.C. The main service equipment grounding conductor shall be connected to the grounding conductor on the supply side of the service disconnecting means in accordance with Table 250.122 of the N.E.C. for the ampere rating of the service entrance equipment. Where in a service entrance switchboard, the equipment grounding conductor shall not be less than 25% of the main bus rating. These connections shall be made inside the service entrance equipment enclosure.

3.2 TRANSFORMER GROUNDS

A. Dry type insulation transformers with a grounded conductor in the secondary shall be grounded in accordance with N.E.C. Section 250-30.

3.3 EXPOSED NON-CURRENT-CARRYING METAL PARTS

A. General: Ground connections to equipment or devices shall be made as close to the current carrying parts as possible, that is, to the main frame rather than supporting structures, bases or shields. Grounding connections shall be made only to dry surfaces that are clean and dry. Steel surfaces shall be ground or filed to remove all scales, rust, grease, and dirt. Copper and galvanized steel shall be cleaned to remove oxide before making welds or connections. Code size ground conductors shall be run in all power conduits and properly terminated at each end.

B. Ground conductors shall be routed as straight as possible. Where possible, ground conductors shall be routed such as to avoid bends exceeding 90 degrees or with a radius of less than 8".

C. Motors: Exposed non-current-carrying metal parts, shall be grounded by a grounding conductor either run with power conductors, and/or separate grounding conductors. Drawings will show method(s) to be used. The ground conductors with all motor conductors shall be connected to the ground buss in the motor connection box. Jumper connections shall be installed between frames and rigid conduit for equipment having flexible conduit connections (sealtight). All AC motor grounds shall provide a low impedance path to ground.

D. Raceways & boxes: All raceways, conduits, armored or shielded cable and all exposed non-current carrying metal parts shall be grounded. Such items shall be bonded together and permanently grounded to the equipment ground buss. Metallic conduits shall be connected by grounding or clamps to ground buss. Flexible "jumpers" shall be provided around all raceway expansion joints. Bonding straps for steel conduit shall be copper. Jumper connections shall be provided to effectively ground all sections or rigid conduit connected into plastic pipe. No metallic conduit shall be left ungrounded. In conduit systems interrupted by junction or switch boxes where locknuts and bushings are used to secure the conduit in the box, the sections of conduit and box must be bonded together. If conduit, couplings or fittings have a protective coating or non-conductive material, such as enamel, such coating must be thoroughly removed from threads of both couplings and conduit and the surface of conduit or fitting where the ground clamp is secured.

E. Enclosures: Metal conduits entering free standing motor control centers, switchboards or other free standing equipment shall be grounded by bare conductors and approved clamp. Any conduits entering low voltage (480 volts or below) equipment through sheet metal enclosure and effectively grounded to enclosure by double locknut or hub need not be otherwise bonded.

F. Equipment: In addition to equipment grounding provisions mandated by code requirements, additional equipment grounding provisions (including local ground rods, connections, etc.) shall be provided by the contractor as directed by equipment suppliers.

G. Both ends of ground busses in motor control centers, switchboards, etc., shall be separately connected to the main ground buss to form two separate paths to ground.

H. Fences and Grills: Fences and metal grills around equipment carrying voltage above 500 volts between phases shall be bonded together and to ground. Fences and grill work shall be grounded at every post, column, or support, and on each side of every gate.

3.4 ACCEPTANCE DOCUMENTATION AND TESTING

A. Contractor shall take and store photographs of all underground grounding system connections

prior to burial of connections, for review by Engineer.

B. Upon completion of work, the entire ground system shall be shown to be in perfect working condition, in accordance with the intent of the Specifications.

C. Contractor shall measure the resistance between the main ground bonding jumper to true earth ground using the Fall of Potential method as described by ANSI/IEEE Standard 81 ("Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of an Earth System"). If the measured value is greater than five ohms, additional grounding electrodes shall be installed as described in Part 3.1 above. The final ground resistance value shall be submitted in writing, and documented via picture of the meter reading from the Fall of Potential test, to the Architect prior to the final observation, and shall be included in final O&M documentation.

END OF SECTION 26 05 26

SECTION 26 05 33

RACEWAYS

PART 1 - GENERAL

1.1 DESCRIPTION

A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:
1. Conduits
2. Conduit Fittings
3. Couplings & Connectors
4. Bushings
5. Raceway Hardware, Conduit Clamps & Supports
6. Watertight Entrance Seal Devices

PART 2 - PRODUCTS

2.1 CONDUITS

A. Rigid Galvanized Steel and I.M.C.:
1. Shall be galvanized outside and inside by hot dipping.
2. Shall be as manufactured by Republic, Wheatland, Pittsburg Standard, Youngstown, Allied or equal.

B. E.M.T.:
1. Shall be Electro-Galvanized.
2. Shall be as manufactured by Republic, Wheatland, Pittsburg Standard, Youngstown, Allied or equal.

C. Rigid Aluminum:
1. Shall be manufactured of 6063 Alloy, T-1 temper.
2. Shall be manufactured by Republic (Nucor), Wheatland, Allied (Atkore), Penn or equal.

D. Schedule 40 and 80 PVC:
1. Shall be composed of polyvinyl chloride and shall be U.L. rated type 40 or 80 for use with 90 degree rated conductors. Conduit shall conform to NEMA Standards and applicable sections of N.E.C.
2. The conduit manufacturer shall have had a minimum of 5 years experience in the manufacture of the products. Non-metallic raceways shall be as manufactured by Carlon, Triangle, Can-Tex, Allied or equal.

E. HDPE Innerduct
1. Shall be composed high density polyethylene and shall be orange in color, unless noted otherwise.
2. Shall be corrugated unless noted otherwise.
3. Shall be manufactured by Carlon, Ipex or equal.

F. Flexible Metallic Conduit:

1. Shall be continuous spiral wound and interlocked galvanized material, code approved for grounding.

G. Liquidtight Flexible Metallic Conduit:
1. Shall be galvanized steel-core sealtite, code approved for grounding.
2. Shall have an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core.
3. Shall be as manufactured by Electric-Flex, Anaconda or equal.

2.2 FITTINGS, COUPLINGS & CONNECTORS

A. Rigid Galvanized Steel and I.M.C. couplings and connectors shall be standard threaded type, galvanized outside and inside by hot dipping. Threadless and clamp type are not acceptable. Couplings/connectors shall be as manufactured by Raco, Efcor, or Appleton or equal.

B. All rain tight connectors shall be threaded Myers or approved equal, rated for outdoor application.

C. E.M.T. couplings and connectors shall be set screw, or steel compression type. All couplings and connectors shall be 720B, 730, 750B, or 760 series of Efcor or equal series of Raco. Pressure indented type connectors or cast metal will not be approved for any location. E.M.T. couplings and connectors shall be as manufactured by O-Z/Gedney, T&B, Efcor, Raco, Midwest or equal. E.M.T. fittings, couplings and connectors located within concrete (where allowed) shall be compression type and shall be adequately sealed with tape to ensure a concrete-tight seal.

D. Rigid Aluminum couplings and connectors shall be standard threaded type, of the same alloy as the associated conduit. Threadless and clamp type are not acceptable. Fittings shall be as manufactured by Thomas & Betts, Crouse-Hinds, Appleton, Pyle-National or equal.

E. All PVC couplings, adapters, end bells, reducers, etc., shall be of same material as conduit.

F. Liquidtight Flexible Metallic Conduit connectors shall be liquidtight with insulating throat or end bushing, designed for application with Liquidtight Flexible Metallic Conduit. Fittings shall be as manufactured by Efcor, Raco, Midwest or equal.

G. All LB unilets sizes 1 ¼" or larger shall have rollers.

H. Miscellaneous conduit fittings shall be as manufactured by Appleton, Crouse-Hinds, Pyle-National, Russell & Stoll or equal.

2.3 BUSHINGS

A. All non-grounding rigid bushings 1-1/4" and larger shall be the insulating type (O-Z/Gedney type "BB" or equal by T&B, Midwest Electric or Penn Union).

B. All non-grounding rigid bushings 1" and smaller shall be threaded malleable iron with integral noncombustible insulator rated for 150°C. Non-grounding rigid conduit bushings shall be O-Z/Gedney type "B" or equal by T&B, Midwest Electric or Penn Union.

C. All grounding rigid bushings shall be threaded malleable iron with integral noncombustible insulator rated for 150°C. All grounding rigid conduit bushings shall be O-Z/Gedney type

"BLG" or equal by T&B, Midwest Electric or Penn Union.

2.4 HARDWARE, CONDUIT CLAMPS AND SUPPORTS

A. All hardware such as expansion shields, machine screws, toggle bolts, "U" or "J" bolts, machine bolts, conduit clamps and supports shall be of corrosion resistant materials (stainless steel, aluminum, galvanized or plated steel, or other approved materials).

B. Hardware in contact with aluminum handrails, plates or structural members and all hardware in exterior, wet or corrosive areas shall be type 316 stainless steel or aluminum (with bitumastic paint coating to isolate aluminum from contact with concrete where necessary) unless specifically noted otherwise.

C. Supports in exterior, wet or corrosive locations shall be type 316 stainless steel or aluminum (with bitumastic paint coating to isolate aluminum from contact with concrete where necessary) unless specifically noted otherwise.

D. Supports in extremely corrosive environments (such as chlorine or fluoride storage rooms) shall be PVC-Coated aluminum unless specifically noted otherwise.

E. Hardware and conduit clamps shall be as manufactured by Efcor, Steel City, G.A., Tinnerman or equal.

2.5 WATERTIGHT ENTRANCE SEAL DEVICES

A. For new construction, seal devices shall consist of oversized sleeve and malleable iron body with sealing rings, pressure rings, sealing grommets and pressure clamps as required (O-Z/Gedney type FSK/WSK or equal).

B. For cored-hole applications, seal devices shall consist of assembled dual pressure disks with neoprene sealing rings and membrane clamps as required (O-Z/Gedney type CSM or equal).

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Minimum Diameter: 1/2-inch.

B. Raceway Type: Raceway types shall be as specified below, unless indicated otherwise on drawings:
   1. Exterior, Exposed: Rigid Galvanized Steel or I.M.C. unless otherwise noted.
   2. Other Exterior (Concrete-Encased or Direct Earth Buried): Schedule 40 PVC. PVC conduit shall convert to metallic conduit prior to exiting concrete-encasement or direct earth burial. See "transition" items below for additional requirements. Conduits shall be left exposed until after Architect's observation.
   3. Interior, Exposed:
      a. Hazardous Locations: Rigid Galvanized Steel .
      b. Wet Locations (including, but not limited to, Pump Rooms, Wet Wells, Underground Vaults, and other similar locations): Rigid Galvanized Steel or I.M.C. .
      c. Dry Locations Where Subject to Mechanical Damage (including, but not limited to, below 10'-0" A.F.F. in shop, storage, warehouse and other similar areas): Rigid Galvanized Steel or I.M.C..

d. Extremely Corrosive Locations (Chlorine Storage Rooms, Fluoride Storage Rooms and other similar areas): Schedule 80 PVC.
e. Other Dry Locations: E.M.T.

4. Interior, Concealed:
   a. Embedded inside Poured Concrete Walls, Ceilings or Floors, with a minimum of 2" of concrete between finished surface and outer wall of conduit on all sides, where no anchor bolts, screws or other similar items will be installed: Schedule 40 PVC. PVC conduit shall convert to metallic conduit (exact type as specified elsewhere within this section) prior to exiting poured concrete-encasement of wall, ceiling, floor or ductbank. See "transition" items below for additional requirements.
   b. Other Raceways Embedded inside Poured Concrete Walls, Ceilings or Floors (not meeting requirements above): Rigid Galvanized Steel or I.M.C. (coated with two (2) spiral-wrapped layers of 3M Scotchrap 50 PVC tape or two coats of asphaltum paint where below grade or within concrete).
   c. Other Raceways: E.M.T.
5. Terminations at motors, transformers and other equipment which has moving or vibrating parts:
   a. Exterior or Wet Locations (including, but not limited to, Pump Rooms, Wet Wells, Underground Vaults, and other similar locations): Liquidtight Flexible Metallic Conduit (shall generally not exceed 24 inches in length) with watertight fittings.
   b. Dry, Interior Locations: Flexible Metallic Conduit (shall generally not exceed 24 inches in length).
6. Terminations at fixtures mounted in grid-type ceilings:
   a. Flexible Metallic Conduit or MC cabling (shall generally not exceed 72 inches in length and shall run from junction box to fixture, not from fixture to fixture).
7. Transition from underground or concrete-encased to exposed:
   a. Convert PVC to Rigid Galvanized Steel (coated with two (2) spiral-wrapped layers of 3M Scotchrap 50 PVC tape or two coats of asphaltum paint where below grade or within concrete) utilizing Rigid Galvanized Steel 90 degree bends (and vertical conduits as required by application) prior to exiting concrete/grade (except at outdoor pull boxes and under freestanding electrical equipment, where terminations shall be by PVC end bells installed flush with top of slab). Exposed portions of these coated conduits shall extend a minimum of 6" above floor level, and shall be installed at uniform heights.

3.2 RACEWAY INSTALLATION

A. General:
1. Follow methods which are appropriate and approved for the location and conditions involved. Where not otherwise shown, specified, or approved in a particular case, run all wiring concealed.
2. Where conduit crosses a structural expansion joint an approved conduit expansion fitting shall be installed.
3. A non-conductive polypropylene pull string, properly tied/secured at either end, shall be installed in all empty conduits.
4. Metal conduit field-cuts shall be cut square with a hacksaw and the ends reamed after threading.
5. PVC conduit field-cuts shall be made with hacksaw, and ends shall be deburred.
6. All PVC joints shall be made as follows:
   a. Clean the outside of the conduit to depth of the socket, and the inside of socket with an approved cleaner.

   b. Apply solvent cement as recommended by the conduit manufacturer to the interior of the socket and exterior of conduit, making sure to coat all surfaces to be joined.
   c. Insert conduit into the socket and rotate 1/4 to 1/2 turn and allow to dry.
7. All metallic conduit installed below grade or within concrete shall be coated with two (2) spiral-wrapped layers of 3M Scotchrap 50 PVC tape or two coats of asphaltum paint prior to installation.
8. Install ground wire sized per N.E.C. Table 250.122 in all conduits.
9. Use of running threads is absolutely prohibited. Conduit shall be jointed with approved threaded conduit couplings. Threadless and clamp type not acceptable.
10. Conduits shall be sized in accordance with latest National Electrical Code except when size shown on drawings. 1/2-inch conduit shall not contain conductors larger than No. 12 or more than four (4) No. 12 conductors.
11. Exposed, field-cut threads on all metal conduits shall be painted with zinc primer (for Galvanized Rigid or I.M.C.) .

B. Routing/Locating:
1. Exposed conduit runs shall be run level and plumb and shall, on interior of buildings, be run parallel and/or at right angles to building walls and/or partitions.
2. Conduit with an external diameter larger than 1/3 the thickness of a concrete slab shall not be placed in the slab. Conduits in slab shall not be spaced closer than 3 diameters on center.
3. Conduit run in ceiling spaces shall be run as high as possible, all at same level, and shall be supported from building structure. Do not support conduit from any other installation.
4. Conduit run within exterior CMU, concrete or other similar walls shall be run within the CMU cells / concrete structure / etc. Conduits shall not be run on the outside surface of CMU cells / concrete structure / etc. underneath exterior veneers / etc., which could cause a thermal break in the wall insulation or a future water intrusion problem.
5. Install conduit runs to avoid proximity to steam or hot water pipes. In no place shall a conduit be run within 6” of such pipes except where crossing is unavoidable, then conduit shall be kept at least 3” from the covering of the pipe crossed.
6. Before installing raceways for motors, HVAC equipment and other fixed equipment, check location of all equipment connections/terminal boxes with equipment supplier and locate and arrange raceways appropriately.
7. A minimum of 12” of clearance (or more as required by associated utility companies) shall be provided between the finished lines of exterior, underground conduit runs and exterior, underground utilities (gas, water, sewer, etc.).
8. Where any portion of raceway is installed in a wet environment (such as below grade) and located at a higher elevation than the raceway termination point in a dry environment, install watertight compound inside raceway at termination around cabling to prevent transfer of water through conduit system. Watertight compound shall be rated for the potential water head pressure, based on the assumption that ground water level would be at grade level.

C. Bends:
1. Do not make bends (in any raceway, including flexible conduits) that exceed allowable conductor bending radius of cable to be installed or that significantly restrict conductor flexibility.
2. All bends within concrete-encased ductbanks installed in exterior locations shall be long radius bends (24” minimum bending radius – varies with conduit diameter).
3. Where numerous exposed bends or grouped together, all bends shall be parallel, with same center and shall be similar in appearance

4. All PVC elbows, bends, etc., shall be either factory bends or made with an approved heat bender.

D. Support:
1. Anchor conduit securely in place by means of approved conduit clamps, hangers, supports and fastenings. Arrangement and methods of fastening all conduits shall be subject to Engineer's direction and approval. All conduits shall be rigidly supported (wire supports may not be used in any location). Use only approved clamps on exposed conduit.
2. Conduit in riser shafts shall be supported at each floor level by approved clamp hangers.
3. Right angle beam clamps and U bolts shall be specially formed and sized to snugly fit the outside diameters of conduits.
4. Where installed in seismic zones, suspended raceways shall be braced in two (2) directions as required to prevent swaying and excessive movement.
5. Raceways installed on top of flat roofing shall be supported a minimum of 3 ½" above roof with rubber block supports (Cooper B-Line Dura-Blok or equal). Installation shall be in strict accordance with support manufacturer's instructions and recommendations.

E. Terminations:
1. All conduit connections to sheet metal cabinets or enclosures located in exterior or wet locations shall terminate by use of rain tight (Meyers) hubs.
2. Where rigid or I.M.C. conduits enter sheet metal boxes, they shall be secured by approved lock nuts and bushings.
3. Where metal conduits enter outdoor pull boxes, manholes, under freestanding electrical equipment or other locations where direct metal-to-metal contact does not exist between enclosure and conduit, grounding bushings shall be installed. Each grounding bushing shall be connected to the enclosure ground and all other grounding bushings with properly sized grounding conductors.
4. Where E.M.T. enters sheet metal boxes they shall be secured in place with approved insulating fittings.
5. Where PVC enters outdoor pull boxes, manholes or under freestanding electrical equipment, PVC end bells shall be installed.
6. Contractor shall be responsible for coordinating required conduit sizes with equipment hubs/conduit entry provisions (such as at motor tap boxes) prior to installation of conduit systems. Contractor shall field adjust final conduit sizes at terminations where so required (only as allowed by code) from those indicated on plans to coordinate with equipment hubs/conduit entry provisions.
7. Where conduit terminates in free air such that associated cabling/circuitry becomes exposed (such as at cable trays, etc.), conduit shall generally terminate in a horizontal orientation (to prevent dust/debris/etc. from entering conduit system). Where vertical conduit termination is necessary, the termination shall be provided with cord-grip conduit terminations to seal the conduit system.
8. Conduit ends shall be carefully plugged during construction.
9. Permanent, removable caps or plugs shall be installed on each end of all empty raceways with fittings listed to prevent water and other foreign matter from entering the conduit system.

F. Penetrations:
1. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly. Refer to drawings and other specifications for additional requirements.
2. All penetrations shall be at right angles unless shown otherwise.

3. Structural members (including footings and beams) shall not be notched or penetrated for the installation of electrical raceways unless noted otherwise without specific approval of the structural engineer.
4. Dry-packed non-shrink grout or watertight seal devices shall be used to seal openings around conduits at all penetrations through concrete walls, ceilings or aboveground floors.
5. All raceways entering structures, or where water is otherwise capable of entering equipment/devices through the raceway system, shall be sealed (at the first box or outlet) with foam duct sealant to prevent the entrance of gases or liquids from one area to another or into equipment/devices.
    a. Where the elevation of the raceway penetration (into the structure) is no more than 15' below the other (higher) end of the same raceway, Polywater FST sealant (rated to hold back up to 22' of continuous water head pressure), or pre-approved equal, shall be used.
    b. Where the elevation of the raceway penetration (into the structure) is between 15' and 75' below the other (higher) end of the same raceway, Polywater PHRD Custom Mechanical Seals (rated to hold back up to 36psi or 83' of continuous water head pressure), or pre-approved equal, shall be used.
    c. Where the elevation of the raceway penetration (into the structure) is more than 75' below the other (higher) end of the same raceway, the contractor shall propose a custom solution designed to hold back or to drain the possible water within the associated raceway. Submittals shall be provided to the engineer for review/approval, including a summary of the anticipated elevations/PSIs, details of the proposed installation, cut-sheets of devices/materials, etc.
6. Additionally, where necessary to ensure that water does not enter equipment/devices through the raceway system (where raceways extend to equipment/devices from wet areas), junction boxes with drain assemblies in bottom shall be located at low point of raceway system near equipment/devices (to drain water out of raceway system before it enters equipment/devices). Contractors shall provide drains in raceway systems where so necessary to prevent water entry into equipment/devices.
7. All raceways passing through concrete roofs or membrane-waterproofed walls or floors shall be provided with watertight seals as follows:
    a. Where ducts are concrete encased on one side: Install watertight entrance seal device on the accessible side of roof/wall/floor as directed by equipment manufacturer.
    b. Where ducts are accessible on both sides: Install watertight entrance seal device on each side of roof/wall/floor as directed by equipment manufacturer.
8. All raceways passing through walls of rooms containing/storing noxious chemicals (chlorine, ammonia, etc.) or through hazardous locations shall be sealed with conduit seals (Crouse-Hinds type EYS or equal).
9. All raceways terminating into electrical enclosures/devices/panels/etc. located in hazardous locations shall be sealed with conduit seals (Crouse-Hinds type EYS, EZS or equal) within 18" of the termination.

G. Exterior Electrical Ductbanks:
1. Where exterior electrical concrete-encased ductbanks are indicated on drawings, conduit runs between buildings or structures shall be grouped in concrete-encased ductbanks as follows:
    a. A minimum of 3" of concrete shall encase each side of all ductbanks.
    b. A minimum of 1 ½" of separation shall be provided between each conduit within ductbanks. PVC spacers shall be installed at the necessary intervals prior to placement of concrete to maintain the required spacing and to prevent bending or displacement of the conduits.

c. Top of concrete shall be a minimum of 30" below grade. A continuous magnetic marking tape shall be buried directly above each ductbank, 12" below grade.
d. Exact routing of ductbanks shall be field verified and shall be modified as necessary to avoid obstruction or conflicts.
e. Underground electrical raceways shall be installed to meet the minimum cover requirements listed in NEC Table 300.5. Refer to drawings for more stringent requirements.

END OF SECTION 26 05 33

SECTION 26 05 34

OUTLET BOXES, JUNCTION BOXES, WIREWAYS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Outlet and Junction Boxes

B. Pull Boxes

C. Wireways

PART 2 - PRODUCTS

2.1 OUTLET BOXES & JUNCTION BOXES (THROUGH 4-11/16")

A. Sheet Metal: Shall be standard type with knockouts made of hot dipped galvanized steel as manufactured by Steel City, Raco, Appleton, Bowers or equal.

B. Cast: Shall be type FS, FD, JB, GS, or SEH as required for application as manufactured by O-Z/Gedney, Appleton, or equal.

C. Nonmetallic: Shall be type Polycarbonate/ABS construction as required for application with non-metallic quick-release latches as manufactured by Hoffman, O-Z/Gedney, Appleton, or equal.

2.2 JUNCTION AND PULL BOXES (LARGER THAN 4-11/16")

A. Oil-Tight JIC: Shall be Hoffman Type CH box or approved equal.

B. Galvanized Cast Iron or Cast Aluminum: Shall be O-Z/Gedney or approved equal.

C. Stainless Steel: Shall be as manufactured by O-Z/Gedney, Hoffman or approved equal. Boxes shall have continuous hinges, seamless foam-in-place gaskets and screw-down clamps.

D. Nonmetallic: Shall be type Polycarbonate/ABS construction as required for application with non-metallic quick-release latches as manufactured by Hoffman, O-Z/Gedney, Appleton, or equal. Boxes shall have hinged covers and screw-down clamps.

E. Wireways: Shall be standard manufacturer's item as manufactured by Hoffman, Square "D", Burns, B & C or equal. Wireways shall have hinged covers and screw-down clamps.

F. Pre-cast Polymer Concrete Below-Grade Hand Holes & Pull Boxes:
1. Enclosures, boxes and cover are required to be UL Listed and conform to all test provisions of ANSI/SCTE 77 "Specifications For Underground Enclosure Integrity" for Tier 15 applications (15,000lb design load and 22,500lb test load) unless noted otherwise.
2. All covers shall have a minimum coefficient of friction of 0.05 in accordance with ASTM C1028 and the corresponding Tier level shall be embossed on the top surface.

3. Cover shall be bolt-down include factory-labeling to read “Electric”, “Communications” or other as directed.
4. Hardware shall be stainless steel.
5. Shall be Quazite PG/LG Style or approved equal.

G. Galvanized Cast Iron Below-Grade Pull Boxes:
1. Enclosures, boxes and cover are required to conform to AASHTO H-20 requirements for deliberate vehicular traffic applications unless noted otherwise.
2. Cover shall be checkered, bolt-down include factory-labeling to read “Electric”, “Communications” or other as directed.
3. Hardware shall be stainless steel.
4. Shall be furnished with grounding kit.
5. Shall be O-Z/Gedney Type YR or approved equal.
   a.

PART 3 - EXECUTION

3.1 APPLICATION

A. General
1. All boxes and wireways shall be of sufficient size to provide free space for all enclosed conductors per NEC requirements. Fill calculations shall be performed by contractor per NEC requirements.

B. Outlet Boxes & Junction Boxes (through 4-11/16”)
1. Sheet metal boxes shall be used on concealed work in ceiling or walls and exposed work in dry, interior locations
   a. Exception: Where exposed and installed within finished/public spaces such as offices, corridors, lobbies, etc., cast boxes shall be used for wiring device outlets. Cast boxes are not required in back-of-house areas such as electrical rooms, mechanical rooms, etc. .
2. Cast boxes shall be used wherever Rigid or I.M.C. conduits are installed.
3. All boxes installed in extremely corrosive areas (such as chlorine and fluoride storage rooms) where non-metallic raceways are used shall be non-metallic.
4. Except when located in exposed concrete block, switch and receptacle boxes shall be 4" square for single gang installation. Appropriate gang boxes shall be used for mounting ganged switches.
5. When installed in exposed concrete block, switch and receptacle boxes shall be square type designed for exposed block installation.
6. Ceiling outlet boxes shall be 4" octagon 1-1/2" deep or larger required due to number of wires.
7. Boxes installed in hazardous locations shall be explosion-proof rated for the associated application, constructed of copper-free cast aluminum.

C. Junction & Pull Boxes (larger than 4-11/16”)
1. For all below grade exterior use and elsewhere as shown:
   a. In areas subject to future vehicular traffic: shall be galvanized cast iron (rated AASHTO H-20 Loading unless noted otherwise).
   b. In areas not subject to vehicular traffic: shall be galvanized cast iron or pre-cast polymer concrete (rated for Tier 15 Loading unless noted otherwise).

2. All boxes installed exposed in exterior or wet areas shall be powder-coated galvanized steel (NEMA 3R).
3. All boxes installed exposed in corrosive areas shall be stainless steel (NEMA 4X).
4. All boxes installed in extremely corrosive areas (such as chlorine and fluoride storage rooms) where non-metallic raceways are used shall be non-metallic.
5. Boxes installed in hazardous locations shall be explosion-proof rated for the associated application, constructed of copper-free cast aluminum.
6. All others shall be oil tight JIC box not less than 16 gauge.

3.2 INSTALLATION

A. General
1. All boxes and wireways shall be securely anchored.
2. All boxes shall be properly sealed and protected during construction and shall be cleaned of all foreign matter before conductors are installed.
3. All boxes and wireways shall be readily accessible. Contractor shall be responsible for furnishing and installing access panels per architect's specifications. Locations shall be as directed by the architect as required to make boxes, wireways, electrical connections, etc. accessible where above gypsum board ceilings or in other similar locations.
4. All metallic boxes and wireways shall be properly grounded.
5. Refer to Specification Section 26 05 53 for identification requirements.

B. Outlet Boxes & Junction Boxes (through 4-11/16")
1. Boxes shall be provided with approved 3/8" fixture studs were required.
2. Recessed boxes for wiring devices, surface fixtures, or connections, shall be set so that the edge of cover comes flush with finished surface.
3. There shall be no more knockouts opened in any sheet metal box than actually used.
4. Any unused opening in cast boxes shall be plugged.
5. Back to back boxes to be staggered at least 3 inches.
6. Under no circumstances shall through-the-wall boxes be used.

C. Junction & Pull Boxes (larger than 4-11/16")
1. Pull boxes shall be installed as indicated on plans and/or as required due to number of bends, distance or pulling conditions.
2. Boxes to be imbedded in concrete shall be properly leveled and anchored in place before the concrete is poured.
3. All pull boxes and/or junction boxes installed exterior below grade, shall have their tops a minimum of 1-1/2 inches above surrounding grade and sloped so that water will not stand on lid. A positive drain shall be installed, to prevent water accumulation inside.
4. Above grade pull boxes shall be installed on concrete anchor bases as shown on Plans.

D. Wireways and/or wall-mounted equipment
1. Mount each wireway to channels of the same metal type as the wireway.
2. Conductors serving a wireway shall be extended without reduction in size, for the entire length of the wireway. Tap-offs to switches and other items served by the wireway shall be made with ILSCO type GTA with GTC cap.

END OF SECTION 26 05 34

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Wire and cable identification.

B. Pullbox & Junction Box Identification

C. Electrical distribution & utilization equipment identification.

D. Emergency and Standby Power receptacle identification.

PART 2 - PRODUCTS

2.1 WIRE AND CABLE IDENTIFICATION

A. Intermediate Locations:
1. Wires and cable labels shall be white, thermal transfer, halogen-free, flame-retardant marker plates (sized to accommodate three lines of text) permanently affixed to the associated cable with UV-resistant plastic wire ties. Labels shall be Panduit #M200X/300X series or equal.

B. Circuit/Cable Termination Locations:
1. Wires and cable labels shall be non-ferrous identifying tags or pressure sensitive labels unless noted otherwise.

2.2 ELECTRICAL DISTRIBUTION & UTILIZATION EQUIPMENT IDENTIFICATION

A. Labels on electrical distribution & utilization equipment shall be black-on-white engraved Bakelite nameplates permanently affixed to the equipment with rivets or silicone adhesive unless noted otherwise.

B. Text used on labels on electrical distribution & utilization equipment shall be sufficiently sized to allow user to quickly/easily read labels while standing a normal/reasonable distance from the equipment. Text sizes shall be adjusted based on types of equipment (large switchgear would require larger labels than small toggle-type disconnect switches). If there is any question about what is reasonable, contractor may submit typical physical sample label(s) for each major application to the engineer for review/approval, at its discretion.

C. Labels on electrical distribution equipment fed from emergency or legally-required standby sources (such as emergency generators) shall be white-on-red engraved Bakelite nameplates permanently affixed to the equipment with rivets or silicone adhesive.

2.3 EMERGENCY AND STANDBY POWER RECEPTACLE IDENTIFICATION

A. Receptacles fed from emergency or standby power sources (such as emergency generators) shall be provided with factory-marked engraved coverplates as follows:
1. Emergency System source: Red engraved lettering to read “EMERGENCY”.

2. Legally-Required or Optional Standby Generator source:
   a. If only part of facility is fed with generator backup: Black engraved lettering to read "FED FROM GENERATOR".
   b. If entire facility is fed with generator backup: No "….GENERATOR…" label required.

PART 3 - EXECUTION

3.1 GENERAL

A. Any proposed deviation in identification methods and materials from those described herein shall be submitted to Architect for review and comment prior to installation.

B. Contractor shall provide all labeling or identification required by applicable local, state and national codes. These specifications do not intend to itemize all code-required labeling or identification requirements.

C. All labels/identification shall be positioned such as to be readable from the normal perspective without adjusting wiring/cables/labels. For example, labels/identification of wires/cables within cable trays shall be positioned to point towards the viewer (typically downward for overhead cable trays, or upward for cable trays within trenches).

D. All labels/identification (except for handwritten labels on concealed pullbox/junction box covers as noted below) shall be typewritten/printed/engraved in a neat, workmanlike, permanent, legible, consistent and meaningful manner. Labels shall not be handwritten unless specific approval is granted by engineer.

3.2 WIRE AND CABLE IDENTIFICATION

A. General:
   1. Where cabling is exposed (such as within cable trays), provide two wire ties per cable (one on either end of marker plate to provide a flush installation). Where cabling is concealed (such as within pullboxes/wireways), one wire tie per cable will be acceptable.

B. Intermediate Locations:
   1. Thermal transfer labels shall be securely fastened to all wiring and cabling in the following locations:
      a. Wireways
      b. Pullboxes/Junction boxes larger than 4-11/16"
      c. Pullboxes/Junction boxes through 4-11/16" where wires and cables are not easily identifiable via the color coding and box labeling
      d. Vaults & Manholes
      e. Approximately every 50 feet within cable trays (especially at locations where cables exit or diverge). Labels within cable trays shall be grouped (rather than being pre-labeled on cables and pulled into cable trays).
      f. Other similar intermediate locations.
   2. Labels shall be stamped or printed with the following data so that the feeder or cable can be readily identified and traced:
      a. From where the circuit originates (including panel designation and circuit number):
         1) Ex: "FROM: PP-A CIR. 3 (IN MAIN ELEC ROOM)"
      b. To where the circuit extends (using the common name of the equipment):
         1) Ex: "TO: RTU-6 (ON ROOF)"

c. The purpose of the circuit:
   1) Ex: "POWER"
d. The set number (If parallel power feeds are used).
   1) Ex: "SET NO. 3 OF 4"

C. Circuit/Cable Termination Locations:
1. Where multiple termination points exist within a circuit origination point (panelboard, switchboard, MCC, starter, etc.) or other similar circuit endpoint (control panel, etc.), labels shall be securely fastened to all ungrounded and neutral conductors to clearly identify the terminal and/or circuit number associated with each conductor. For example, within lighting panels, each phase and neutral conductor shall be labeled near the terminals at a clearly visible location with the associated circuit number(s), so that if all conductors were unterminated, the labels would clearly indicate which conductor was associated with each circuit.

D. Refer to Specification Section 26 05 19 for all color-coding requirements of wires and cables.

3.3 PULLBOX & JUNCTION BOX IDENTIFICATION

A. Concealed pullboxes/junction boxes:
1. Front surface of all pullbox/junction box covers in concealed areas (such as above lay-in ceilings) or within mechanical/electrical rooms (and other similar areas where appearance of boxes is not an issue) shall be neatly marked with the ID of circuits/cables contained with permanent black marker on cover of box (Ex: "RP-1A Cir. 1, 2 & 3"). Additionally, front surface of box shall be painted red where box contains fire alarm system cabling.

B. Exposed pullboxes/junction boxes:
1. Interior surface of all pullbox/junction box covers in exposed areas shall be labeled "Power", "Telecommunications", "Fire Alarm" or with other similar general text neatly with permanent black marker to indicate function of box. Circuit/cable labeling within box (see above) shall identify specific cables contained. Additionally, interior surface of cover shall be painted red where box contains fire alarm system cabling.

C. Where pullboxes/junction boxes are named on contract documents (Ex:"PULLBOX #3"), an engraved nameplate shall be installed on the front surface of the box to identify the name.

3.4 ELECTRICAL DISTRIBUTION & UTILIZATION EQUIPMENT IDENTIFICATION

A. General:
1. All new and existing equipment modified by this project shall include arc-flash warning labels in accordance with NEC article 110.16.

B. All Panels, Motor Control Centers, Switchboards, Switchgear, Transformers, Etc.:
1. Engraved nameplates identifying name of equipment, nominal voltage and phase of the equipment and where the equipment is fed from shall be installed on front surface of all panels, motor control centers, switchboards, switchgear, transformers, etc.:
   a. Ex: First Line: "NAME: RP-A", Second Line: "120/208V-3Ø-4W", Third Line: "FED FROM: PP-A CIR. 4 (IN MAIN ELEC ROOM)"
2. Refer to Panelboard Specification Sections for additional labeling requirements (circuit directory cards, permanent circuit labels, permanent circuit numbers, etc.) required inside panelboards.

C. Safety/Disconnect Switches and Utilization Equipment (HVAC Equipment, Pumps, Powered Valves, Control Panels, Starters, Etc.)::
   1. Engraved nameplates identifying equipment being fed and where the equipment is fed from shall be installed on front surface of all disconnect switches (including both visible blade type switches and toggle-type switches) and on utilization equipment (where not clearly identified by immediately adjacent local disconnect switch):
      a. Ex: First Line: "RTU-6", Second Line: "FED FROM: PP-A CIR. 5"
   2. Where safety/disconnect switches are installed on the load side of variable frequency drives, the safety/disconnect switch shall be furnished with an additional engraved nameplate to read: "WARNING: TURN OFF VFD PRIOR TO OPENING THIS SWITCH".
   3. Safety/Disconnect switches feeding equipment that is fed from multiple sources (such as motors with integral overtemperature contacts that are monitored via a control system) and Utilization Equipment fed from multiple sources shall be furnished with an additional BLACK-ON-YELLOW engraved nameplate to read: "WARNING: ASSOCIATED EQUIPMENT FED FROM MULTIPLE SOURCES – DISCONNECT ALL SOURCES PRIOR TO OPENING COVER".

D. Emergency Systems:
   1. A sign shall be placed at the service entrance equipment (and at any remote shunt trip operators, or similar, for service equipment) indicating the type and location of on-site emergency power sources (such as generators, central battery systems, etc.) per NEC requirements.
   2. All boxes and enclosures (including transfer switches, generators, power panels, junction boxes, pullboxes, etc.) dedicated for emergency circuits shall be permanently marked with white-on-red engraved nameplates so they will be readily identified as a component of an emergency circuit or system.
   3. Where an Essential Electrical System (EES) is installed, all enclosures, raceways and equipment that are components of the EES shall be readily identified as such. Raceway shall be identified at intervals not exceeding 25 ft.

E. Services:
   1. All Service Equipment:
      a. Engraved nameplates identifying maximum available fault current, including date the fault current calculation was performed, in accordance with NEC article 110.24.
         1) Ex: First Line: "AVAILABLE FAULT CURRENT: 16,154 AMPS", Second Line: "DATE CALCULATED: JULY 8, 2013"
      b. All service entrance equipment shall be clearly labeled as being service entrance rated.
   2. Where a building or structure is supplied by more than one service (or any combination of branch circuits, feeders and services), a permanent plaque or directory shall be installed at each service disconnect location denoting all other services, feeders & branch circuits supplying that building or structure and the area served by each, per NEC requirements.

F. Generators:
   1. Generators shall be labeled with engraved nameplates identifying name of equipment.

3.5 EMERGENCY AND STANDBY POWER RECEPTACLE IDENTIFICATION

A. Receptacles fed from emergency or standby power sources (such as emergency generators) shall be provided with factory-marked engraved coverplates as described above.

3.6 OTHER IDENTIFICATION

A. Factory-engraved coverplates identifying functions of light switches and other similar devices shall be installed where so required by plans/specifications.

END OF SECTION 26 05 53

SECTION 26 05 73

POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:
   1. Power Distribution System Electrical Studies.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Short Circuit Studies, Protective Devices Evaluation Studies, Protective Device Coordination Studies and Arc Flash Hazard Studies shall be performed by the same entity, which shall be a Professional Engineer registered in the state where the equipment will be installed. The studies shall be per the requirements set forth in the latest edition of NFPA 70E-Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E, Annex D.

B. The studies shall be submitted to the Architect prior to shipment of any electrical distribution equipment.

C. The studies shall include all portions of all electrical systems affected by the project (including any existing systems/equipment) from the utility service to any existing equipment at the facility (including all existing equipment fed from the same service point as any new equipment) and to all new equipment installed under this contract. All induction motors 50 HP or below and fed from the same bus may be grouped together. All induction motors greater than 50 HP shall be included individually with associated starters and feeder impedance. See individual study sections below for additional scope requirements.

D. The studies shall be performed using the latest revision of the SKM Systems Analysis Power*Tools for Windows (PTW) or EasyPower software program.

E. Normal system connections and those which result in maximum fault conditions shall be adequately covered in the study.

F. The contractor shall be responsible for collecting data on any existing or proposed electrical equipment, devices, conductors, etc. as required to prepare the study, and shall supply pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the studies to be completed prior to shipment of equipment.

G. The Power Distribution System Electrical Studies shall be performed by Square 'D', G.E., Siemens or Cutler Hammer; or a third-party vendor if specifically approved by the engineer prior to preparation of the studies.

H. The proposed vendor shall have completed a minimum of five (5) equivalent Arc-Flash Hazard

Studies in the past three (3) years.

2.2 SHORT CIRCUIT STUDY

A. The Short Circuit Study shall be performed with aid of a computer program. The study input data shall include the power company's short circuit contribution, resistance and reactive components of the branch impedances, X/R ratios, base quantities selected, and other source impedances.

B. Short circuit momentary duty values and interrupting duty shall be calculated on each individual basis with the assumption that there is a three-phase bolted short circuit at the respective switchgear bus, switchboard, low voltage motor control center, distribution panelboard, and other significant locations throughout the system.

C. The short circuit tabulation shall include symmetrical and asymmetrical fault currents, and X/R ratios. For each fault location, the total duty on the bus, as well as the individual contributions from each connected branch, including motor back EMF current contributions shall be listed with its respective X/R ratio.

2.3 PROTECTIVE DEVICE EVALUATION STUDY

A. The Protective Device Evaluation Study shall be performed to determine the adequacy of circuit breakers, switches, transfer switches, and fuses by tabulating and comparing the short circuit rating of these devices with the calculated fault currents. Appropriate multiplying factors based on system X/R ratios and protective device rating standards shall be applied.

B. Any problem areas or inadequacies in the equipment due to short circuit currents shall be promptly brought to the Architect's attention.

2.4 PROTECTIVE DEVICE COORDINATION STUDY

A. The Protective Device Coordination Study shall be performed to provide the necessary calculation and logic decisions required to select or to check the selection of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low voltage breaker trip characteristics and settings. The objective of the study is to obtain optimum protective and coordination performance from these devices.

B. The coordination study shall show the best coordination attainable for all breakers down through the largest breaker at each piece of distribution equipment. Coordination study shall demonstrate selective coordination where required by applicable codes or contract documents.

C. Phase and ground overcurrent protection shall be included as well as settings of all other adjustable protective devices. Where ground fault protection is used, coordination of the ground fault protection with the first downstream overcurrent phase protection device shall be demonstrated.

D. All restrictions of the National Electrical Code shall be adhered to and proper coordination intervals and separation of characteristic curves be maintained.

2.5 ARC-FLASH HAZARD STUDY

A. The Arc-Flash Hazard Study shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection

boundary distances.

B. The Arc-Flash Hazard Study shall be performed in conjunction with a short-circuit Study and a time-current coordination Study.

C. The Arc-Flash Hazard Study shall be performed for the following equipment:
1. All Distribution Equipment – This includes but is not limited to the following:
   a. Switchgear
   b. Switchboards
   c. Motor Control Center
   d. All Lighting and Power Panelboards
   e. Fused Disconnect Switches rated greater than 100A
2. Separately enclosed devices fed from protection device rated greater than100A - This includes but is not limited to the following:
   a. Control Panels
   b. VFD's
   c. RVSS

D. A generic Arc-Flash label shall be applied to other electrical equipment that has not been included in the study. This includes but is not limited to the following equipment:
1. Non-fused Disconnect Switches
2. Fused Disconnect Switches rated 100A or less
3. Transformers
4. Control Panels, VFD's, RVSS, etc. rated 100A or less

E. Where a main protective device is provided, the study shall be performed on the line side and load side of the main. The worst-case result shall be used for the study result and label.

F. The Study shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

G. Where incident energies are calculated to fall within the high marginal region of a given Hazard/Risk Category Level, the Hazard/Risk Category Level shall be increased one level.

H. The Arc-Flash Hazard Study shall be performed in compliance with the latest IEEE Standard 1584, the IEEE Guide for Performing Arc-Flash Calculations. Where IEEE 1584 does not have a method for performing the required arc-flash calculations (such as for single phase equipment), calculations shall be performed and system shall be modeled using modules/methods as recommended by the arc flash software supplier (for example, using SKM Unbalanced/Single Phase Studies module for modeling single phase systems).

I. Equipment labels to identify AFIE and appropriate Hazard/Risk Category in compliance with NFPA 70E and ANSI Z535.4 (latest version of these requirements) shall be provided to the Electrical Contractor. The Electrical Contractor shall affix the labels to the distribution equipment devices as directed by the equipment manufacturer. These labels shall, at a minimum, include the following:
1. WARNING label.
2. Hazard/Risk Category.
3. Arc Flash Boundary Distance.
4. Incident Energy (in cal/cm2) at Working Distance.
5. Shock Hazard Voltage.

6. Limited Approach Boundary Distance.
7. Restricted Approach Boundary Distance.
8. Prohibited Approach Boundary Distance.
9. Equipment Name.
10. Name of Firm who prepared the Study.
11. Project Number of the Firm who prepared the Study.
12. Date that the Study was prepared.
13. Method for calculating analysis data.
14. Statement to read: "Any system modification, adjustment of protective device settings, or failure to properly maintain equipment will invalidate this label" (or equivalent).

PART 3 - EXECUTION

3.1 SUBMITTAL REQUIREMENTS

A. The results of the studies shall be summarized in a final report. The report shall include the following sections:
   1. General:
      a. Description, purpose, basis and scope of the studies
      b. Single line diagram of the portion of the power system which is included within the scope of the work. The single line diagram shall fit on one sheet of paper (size as required) unless approved otherwise by engineer. The following information shall be shown on the single line diagram:
         1) Device Name
         2) Branch Fault Currents with directional indicators
         3) General Location (for busses only)
         4) Other basic component information such as cable type, cable length, breaker rating, buss short circuit rating, transformer voltages, transformer size, fuse size, etc..
   2. Short Circuit Study:
      a. Tabulation of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties, and commentary regarding same.
   3. Protective Device Evaluation/Coordination Study:
      a. Protective devices time versus current coordination curves**,** tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
      b. Fault current calculations including definitions of terms and a guide for interpretation of computer printout.
      c. Documentation from utility company on their letterhead showing their anticipated values of available short circuit currents X/R ratios and protective devices with which the power distribution system will coordinate.
      d. Time-current characteristics of the respective protective devices shall be plotted on log-log paper. Plots shall be printed in color with a dedicated color and pattern for each curve for clear identification.
      e. Plots shall include complete titles, respective single line diagrams and legends, and associated power company's relay or fuse characteristics, significant motor starting characteristics, complete parameters of transformers, complete operating bands of low voltage circuit breakers trip curves and fuses.
      f. The coordination plots shall indicate the type of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, transformer magnetizing inrush and

ANSI transformer withstand parameters, cable thermal overcurrent withstand limits and significant symmetrical and asymmetrical fault currents.

g. The coordination plots for phase and ground protective devices shall be provided on a system basis.
h. A sufficient number of separate curves shall be used to clearly indicate the coordination achieved.

4. Arc-Flash Hazard Study:
   a. Tabulation of device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.
   b. Recommendations for reducing AFIE levels and enhancing worker safety.

B. Furnish all labor, materials, calculations, electrical equipment, technical data and incidentals required to provide a complete short circuit study, coordination study and arc flash hazard study of protective devices, busses, etc. from the utility service to any existing equipment at the facility and all new equipment installed under this contract.

C. The study shall comply with the following applicable provisions and recommendations of the latest revisions of the following: ANSI C37.5, IEEE Standard No. 399, and IEEE Standard No. 141.

D. Submit calculations and results of the short circuit, protective device evaluation and coordination and arc flash hazard studies prior to submitting shop drawings for new equipment. Contractor shall verify that all proposed equipment is properly rated per the short circuit and protective device evaluation portions of the study prior to releasing equipment for manufacturing.

E. Submit a copy of a sample typical arc flash label layout (meeting requirements outlined above) that will be used for the project.

F. Submit final electronic copies of all SKM program files/models/input data/etc. used to perform the study to the owner with final close-out documents. These files shall be complete as required to allow future users to recreate the study.

3.2 INSTALLATION

A. Contractor shall adjust all breaker settings as recommended by the coordination study prior to energizing equipment.

B. Contractor shall affix arc flash hazard notification labels (as determined by the results of this study) to each piece of distribution equipment prior to energization of equipment. A generic arc-flash warning label shall be affixed to any electrical equipment not included in the analysis as outlined above.

C. Where short circuit rating of equipment is dependent on setting of upstream overcurrent device, provide and install label for equipment indicating the required settings of the associated device.

END OF SECTION 26 05 73

SECTION 26 09 43

LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.1 INTRODUCTION

A. The work covered in this section is subject to the requirements in the General Conditions of the Specifications. Contractor shall coordinate the work in this section with the trades covered in other sections of the specification to provide a complete and operable system.

1.2 SYSTEM DESCRIPTION

A. Extent of lighting control system work is indicated by drawings and by the requirements of this section. Contractor shall furnish and install a complete, integrated, stand alone automatic lighting control system including programmable Lighting Control Panels with internal astronomic timeclock(s), Networking between panels, Dataline low voltage control switch inputs for zone control, Photocell input for outdoor lighting control, Occupancy Sensors, and Daylighting Controls from a single supplier. Contractor is responsible for confirming that the panels and sensors interoperate as a single system.

1.3 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Comply with NEC, NEMA, and FCC Emission requirements for Class A applications.

C. UL Approvals: Relay panels and accessory devices are to be UL listed under UL 916 Energy Management Equipment. Configured to order or custom relay panels shall be UL Listed under UL 508, Industrial Control Panels.

1.4 SUBMITTALS

A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.
   1. Shop Drawings: Building floorplans showing all proposed devices and composite wiring and/or schematic diagram of each control circuit as proposed to be installed (standard diagrams will not be accepted).
   2. Product Data: Catalog sheets, specifications and installation instructions.

1.5 APPROVED MANUFACTURERS

A. Watt Stopper/Legrand – Lighting Integrator series

B. Equal by Acuity Lighting

C. Any other system wishing to be considered must submit descriptive information 10 days prior to bid. Prior approval does not guarantee final approval by the electrical engineer. The contractor shall be completely responsible for providing a system meeting this specification in its entirety. All deviations from this specification must be listed and individually signed off by the

consultant.

PART 2 - PRODUCTS

2.1 LIGHTING CONTROL PANELS

A. Provide lighting control panels in the locations and capacities as indicated on the plans and schedules. Each panel shall be of modular construction and consist of the following components:

1. Enclosure/Tub shall be NEMA 1, NEMA 3R, or NEMA 4 as indicated on the plans, sized to accept an interior with 1-8 relays, 1-24 relays and six (6) four pole contactors, or 1-48 relays with six (6) four pole contactors, per enclosure. Multiple enclosures shall be provided where required for the specified quantities of relays/contactors.
2. Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.
3. Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (class 1) wiring from low voltage (class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. The panel interiors shall include the following features:
   a. Provision for one or two optional control and automation cards.
   b. Removable, plug-in terminal blocks with screw less connections for all low voltage terminations.
   c. Individual terminal block, override push button, and LED status light for each relay
   d. Switch inputs associated with each relay and group channel shall support two or three wire, momentary or maintained contact switches or 24VDC input from occupancy sensors.
   e. Automatic support for occupancy sensor sequence of operation. Low voltage inputs automatically reconfigure when connected to a Watt Stopper occupancy sensor head. Occupancy sensor shall switch lighting on and off during unoccupied periods but shall not turn lighting off during scheduled occupancy periods.
   f. Isolated contacts within each relay shall provide true relay state to the electronics. True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems.
   g. Automatic sequenced operation of relays reduces impact on the electrical distribution system when large loads are controlled simultaneously.
   h. Group, channel, and pattern control of relays shall be provided through a simple button-press interface within the panel. Any group of relays can be associated with a channel for direct on/off control or pattern (scene) control via a simple programming sequence using the relay and channel override push buttons and LED displays.
   i. Relay group status for each channel shall be provided through bi-color operation of the LED indicators. Solid red indicates that all relays in the group are on, solid green indicates that the group is in a mixed state, and blinking green indicates that the relays have blink warned and are currently timing out.
   j. Each relay and channel terminal block shall provide a 24V pilot light signal. It shall be possible to configure the system for support for any Class 2 pilot light voltage with the use of an auxiliary power supply.

k. Single pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:
   1) Electrical:
      a) 30 amp ballast at 277V
      b) 20 amp ballast at 347V
      c) 20 amp tungsten at 120V
      d) 30 amp resistive at 347V
      e) 1.5 HP motor at 120V
      f) Short circuit current capacity equal to (or greater than) that of the associated circuits (see associated panelboard schedules on drawings)
   2) Mechanical:
      a) Individually replaceable, ½" KO mounting with removable Class 2 wire harness
      b) Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel
      c) Dual line and load terminals each support two #14 – #12 solid or stranded conductors
      d) Tested to 300,000 mechanical on/off cycles
   3) Isolated low voltage contacts provide for true relay status feedback and pilot light indication.

l. Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.

2.2 LONWORKS® BASED DIGITAL COMMUNICATIONS

A. The lighting control panel shall support digital communications to facilitate the extension of control to include multiple panels and other intelligent field devices. Digital communications shall be LonWorks® based and use the LonTalk® protocol in an open topology architecture.
   1. Dataline communications wire shall be 18 AWG, 4 unshielded copper conductors (two independent twisted pairs) meeting Class 2P NEC code requirements. The dataline shall be topology free and can be run in a serial, "T"or star configuration.
   2. The Dataline wire will be supplied by the equipment manufacturer and will include the manufacturers name, catalog number printed on the wire jacket. The contractor, at their own expense will, replace an improper dataline wire.
   3. Panels shall be digitally addressed and support bi-directional communication between each other and other intelligent field devices specified elsewhere.
   4. Intelligent field devices supported shall include digital dataline switches, network clock/programmer, telephone interface module, BMS interface module, photocell control module, programmable thermostat, and universal switch module.

2.3 BROWSER BASED PROGRAMMING AND CONTROL

A. The lighting control system shall include a web browser based user interface that shall allow programming and override of the system from any PC browser with network connectivity to the lighting controls. The Automation Appliance shall include as a minimum the following features:
   1. The interface shall be a TCP/IP based server device that is connected to the lighting control system global dataline and shall not require that software be installed on the client PC(s) for operation.

2. Provide support for connection of one or more personal computers directly via Ethernet or enterprise connectivity via a local area network, wide area network or internet connection.
3. Provide the option for a plug-in 56K baud modem to enable dial in connection via standard telephone line. All functionality of the browser interface shall be available through the dial-up connection.
4. Log in to the lighting control system through the browser interfaced shall provide multi-level security. Users shall be assigned log in access levels to restrict program modification to authorized users.
5. User programming shall include eight independent schedules for each lighting control panel, as well as, eight global schedules that affect channels in all panels on the network. Schedules shall overlap such that a panel specific schedule for any channel will override a global schedule for that channel.
6. Schedules shall be capable of seven day repeating and calendar date event based formats.
7. User programming shall be scenario based and shall include the following options:
   a. Scheduled ON / OFF
   b. Manual ON / Scheduled OFF
   c. Manual ON / Auto Sweep OFF (for AS-100 Switches)
   d. Astro ON / OFF (or Photo ON / OFF)
   e. Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
8. It shall be possible to view the status of and override any relay or channel group via the browser interface screens.
9. Provide support and user interface screens for integration of the photocontrol module, dataline switches, touch-tone telephone module, and universal switch module.
10. Provision for integration with the building automation system shall be via the industry standard BACnet protocol. Any of the eight global schedule channels shall individually be set to follow the BAS schedules rather than the internal Automation Appliance schedules. Relays in all panels shall be exposed to the BAS as binary output objects. It shall be possible for the BAS to read the status of each relay and to override each relay via BACnet.
11. The interface shall monitor all networked components and automatically generate alarms if any component fails to properly respond to control. Alarms shall be annunciated via the browser screens and via email to selected recipients where a proper SMTP server connection has been set up.
12. The user programming in the lighting control panels and dataline switches shall be available for viewing or download to the client PC as a standard PDF file.
13. A backup function shall permit the complete system program to be saved to the hard drive of any client PC connected to the lighting control system through the browser interface. A restore function shall allow a saved program to be reloaded to the interface.

2.4 EIGHT CHANNEL DIGITAL PHOTOCONTROL MODULE

A. Provide a weatherproof Class 2 photocell for measuring exterior light levels. The photocell shall be mounted facing north as indicated on the plans. The photocell shall be connected to a photocontrol module mounted on the DIN rail inside the low voltage section of a lighting control panel and connected to the dataline communications wire.
   1. The photocontrol Module shall integrate seamlessly with either the Network Clock, Automation Appliance, or the BMS Interface Module. The control module shall measure the actual exterior light and display this level in foot candles (fc) on the unit LCD display.
   2. The controller shall have eight individual set point adjustments that are available to the lighting control network over the dataline communications wire.
   3. Features
      a. Real time, 2 line LCD display of actual exterior light level up to 200 fc.

b. Channel set points and parameters programmed via the Network Clock or BMS Interface Module.
c. Choice of OPERATE or TEST modes, with simulated light level for testing.
d. Automatic dead band and 5 minute time delay to avoid cycling.

2.5 DIGITAL DATALINE SWITCHES

A. Intelligent digital switching shall be provided operating on the dual twisted pair communication wire. Switches shall be available in single, dual, quad, or octal (1-button, 2-button, 4-button, or 8-button) designs. The single, dual, and quad devices shall mount in a standard single-gang box, the octal version in a two-gang box.

1. Each button shall be individually programmable. Programming of buttons shall not require the use of a computer or other programming device. It shall be possible to assign relays or channels to buttons using a simple button press interface. Each button can control any one of the following options:
   a. Any individual relay in any single panel.
   b. Any group of relays in any single panel.
   c. Any group of relays in the system (via network clock, Automation Appliance, or WinControl software package).
2. For applications that require pattern switching, buttons shall function as a scene control using an ON/OFF/Not Controlled pattern of relays instead of the normal All ON/OFF.
3. Switches shall be constructed of non-breakable grey Lexan on all exposed parts and shall include a stainless steel wall plate, unless noted otherwise on plans.
4. Individual buttons shall have a removable clear cover to allow standard 9 mm (3/8 inch) labeling tape to be used to identify the controlled loads.
5. Each switch shall use a bi-color LED pilot light for the individual buttons to indicate status of the controlled relay or group of relays. LED indications are Red for All ON, Green for Mixed State (some relays in the group ON and others OFF), and No LED for All OFF.
6. Switch LED pilot lights shall flash green to indicate impending off sweep during the five-minute grace period following blink warning of the lights. Once the button is pressed, the LED will change to Red to acknowledge the occupant's override command to keep lights ON.
7. Multiple dataline switches programmed to control the same relay or relay group shall indicate the same status automatically.
8. Each switch shall also include a locator light illuminating the switch for easy location in the dark.
9. The dual, quad, and octal switches shall all include a single master button that will override all relays controlled by the individual buttons OFF, or Restore them to their original state. Each switch's master button configuration can be altered to perform a Master ON/OFF, OFF Only, or Disabled function if desired.
10. Switches can be configured to follow a "Cleaning" scenario. This specific scenario shall prevent the cleaners from overriding OFF any relays previously turned ON by an occupant.
11. Each switch is available in a Key lock override version. Once a key is inserted, the individual buttons will function for five minutes.

2.6 AUTOMATIC LIGHTING CONTROLS

A. System shall provide automatic lighting shutoff for all interior lighting circuits controlled by the system (excluding night lights and other similar circuits) per latest ASHRAE 90.1 & IECC standards, unless specifically shown otherwise on plans.

B. System shall provide blink-warnings for interior lighting circuits (excluding circuits with HID light fixtures) controlled by the control panel 5 minutes prior to automatic shutoff.

C. System shall include provisions for holiday scheduling, to allow automatic “ON” programming to be skipped on holidays and other scheduled off days per applicable energy code requirements.

D. Low voltage remote override switches shall be provided as shown on drawings.

E. Exact preset times for lighting control zone controls (where applicable) and lighting control system operation shall be per owner’s direction. Contractor shall submit a proposed lighting control schedule indicating type of “ON” control (occupancy, time-of-day, manual, etc.), type of “OFF” control (occupancy, time-of-day, manual, etc.) and proposed preset times for all zones to owner for review prior to implementation. The following general control schemes shall generally be used where the owner has no preferences unless shown otherwise on plans:
   1. Exterior Security Lighting (at doorways, etc.):
      a. On: Photocell or Astronomic – dusk.
      b. Off: Photocell or Astronomic – dawn.
   2. Other Exterior Lighting:
      a. On: Photocell or Astronomic – dusk.
      b. Off: Preset Time (as directed by the facility operator).
   3. Interior Lighting with Occupancy Sensor Controls:
      a. Corridors, restrooms, lobbies and other similar public spaces
         1) On: Occupancy Sensor.
         2) Off: Occupancy Sensor.
      b. Storage rooms, janitor's closets, telecommunications rooms, and other similar unoccupied spaces:
         1) On: Manual Local Switch.
         2) Off: Occupancy Sensor.
      c. Offices, classrooms, breakrooms, conference rooms, work areas, kitchens, gymnasiums, and other similar occupied spaces:
         1) On:
            a) Manual Local Switch (if digital controls are provided) or
            b) Occupancy Sensor (if hardwired controls are provided). Partial on only where required by code.
         2) Off: Occupancy Sensor (A "grace period" shall be provided, in which the occupancy sensor can turn lights back "on" for a short period of time (approximately 15 seconds) after lights are turned off automatically).
   4. Interior Lighting with Time-of-Day Controls:
      a. Corridors, restrooms, lobbies and other similar public spaces
         1) On: Preset Time (as directed by the facility operator).
         2) Off: Preset Time (as directed by the facility operator).
      b. Storage rooms, janitor's closets, telecommunications rooms, and other similar unoccupied spaces:
         1) On: Manual Local Switch
         2) Off: Preset Time (as directed by the facility operator).
      c. Offices, classrooms, breakrooms, conference rooms, work areas, kitchens, gymnasiums, and other similar occupied spaces:
         1) On: Manual Local Switch
         2) Off: Preset Time (as directed by the facility operator).

2.7 WIRING

A. See Specification Section 27 05 00 for additional requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Specification Section 27 05 00 for additional cable installation requirements.

B. Master/centralized lighting control switches (particularly switches located in areas where not all associated lighting fixtures are visible from the switch) and individual buttons of other lighting control stations with more than two (2) buttons shall be labeled (on switch coverplate or directly on buttons) with factory-engraved labeling. Exact wording of labeling shall be per owner's direction unless shown otherwise on plans.

3.2 SUPPORT SERVICES

A. Pre-installation Coordination
1. Exact occupancy sensor and daylight sensor types and locations shall be determined by the lighting control system supplier for a fully-functional system with adequate coverage throughout areas controlled by occupancy sensors. Exact locations shall be coordinated with actual HVAC register locations, furniture/casework/etc. locations, sensor coverage patterns, etc. for proper coverage in all areas. In no case may fewer devices or lower-quality devices be used in each area than indicated on contract documents.

B. System Start Up and Commissioning
1. The electrical contractor shall provide the manufacturer, the facility owner and the electrical engineer with ten working days written notice of the system startup and adjustment date.
2. Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of all lighting control system components. The startup requirement is intended to verify:
   a. That all occupancy and daylighting sensors are located, installed, and adjusted as intended by the factory and the contract documents.
   b. The occupancy sensors and daylighting sensors are operating within the manufacturers specifications.
   c. The sensors and relay panels interact as a complete and operational system to meet the design intent.
3. Manufacturer to provide a written statement verifying that the system meets the above requirements.

C. Re-commissioning – After 30 days from occupancy re-calibrate all preset times, sensor time delays and sensitivities and relocate occupancy sensors if so required to meet the Owner's Project Requirements. Provide a detailed report to the Design Team and Owner of re-commissioning activity.

D. System Training
1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and daylighting controls.

E. System Programming
   1. Manufacturer shall provide system programming including:
      a. Wiring documentation.
      b. Switch operation.
      c. Telephone overrides.
      d. Operating schedules.

3.3 WARRANTY

A. The contractor shall warrant the completed lighting control system to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

END OF SECTION 26 09 43

SECTION 26 22 00

DRY TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 GENERAL

A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:
   1. Dry Type Transformers

1.2 GENERAL REQUIREMENTS

A. Voltage for 3 phase units shall be 480V to 120/208V, three phase, four wire unless shown otherwise. Voltage of single phase units shall be 480V to 120/240V single phase, three wire unless shown otherwise.

B. Where isolation transformer is indicated on drawings, furnish K-13 rated transformer with dual-faraday electrostatic shield.

C.

PART 2 - PRODUCTS

2.1 INSULATION

A. Transformers shall be ventilated with insulation to withstand a minimum of 150 degree Celsius temperature rise (Class 220 insulation) unless specifically shown otherwise on the drawings.

2.2 ENERGY EFFICIENCY

A. Transformers shall comply with the latest applicable DOE energy efficiency requirements and latest edition of NEMA standard TP-1 and shall be labeled for the EPA Energy Star Program.

2.3 SOUND RATING

A. Sound level shall not exceed a 5db reduction from ST-20 maximum requirements. Sound level in decibles may not exceed the following:

	KVA	DESIGN SOUND LEVEL
2.	0-45	40 db
3.	46-150	45 db
4.	151-300	50 db
5.	301-700	57 db

B. Sound levels shall be determined in accordance with NEMA and ASA Standards. Core and coils shall be mounted on vibration isolator pads.

2.4 ENCLOSURES

A. Transformers mounted in dry, interior locations shall be furnished with NEMA 1 enclosures unless shown otherwise.

B. Transformers mounted outdoors or in wet locations shall be furnished with NEMA 3R enclosures with drip shields unless shown otherwise.

C. Transformers installed inside motor control centers or other similarly enclosed equipment may be “open” units not requiring additional enclosures.

2.5 CLEARANCE REQUIREMENTS

A. Transformer construction/efficiency/ventilation shall allow 3” (or less) clearance from rear and sides.

2.6 TAPS

A. All units shall be equipped with a minimum of two (2) 2 ½% taps above nominal (FCAN) and a minimum of four (4) 2 ½% taps below nominal (FCBN) as required to allow adjustment of the turns ratio of the transformer to account for site voltage adjustments.

2.7 MANUFACTURER

A. Transformers shall be Square 'D', G.E., Siemens or Cutler Hammer.

PART 3 - EXECUTION

3.1 GENERAL

A. Minimum clearances shall be provided on all sides of transformers per manufacturer’s and code requirements.

B. Where site voltages so require, transformer taps shall be adjusted to maintain nominal voltage on secondary side of transformer. Adjustment of dry-type transformer taps shall not be made until all upstream voltage adjustments (such as voltage tap adjustments at service transformers) are finalized.

C. Refer to Specification Section 26 05 26 for transformer grounding requirements.

D. Refer to Specification Section 26 05 53 for transformer identification requirements.

3.2 MOUNTING

A. Transformers shall be mounted as indicated on plans. No units shall be wall mounted unless shown or directed otherwise.

B. Floor mounted transformers:
1. Shall be installed on a minimum of four (4) double-deflection neoprene vibration isolators (by Amber/Booth, Korfund Dynamics or Mason Industries - size as required – with seismic restraint capability ratings as required by the associated seismic zone).
2. Shall be installed on four-inch thick concrete pads unless specifically shown otherwise. Pad shall have beveled edges.

C. Suspended transformers:
1. Shall be trapeze-mounted on unistrut frame supported by a minimum of four steel rods and shall be mounted as high as possible or at height directed (transformers shall not be mounted above lay-in ceilings or in areas with restricted ventilation). Shall be installed

using a minimum of four (4) double-deflection neoprene vibration isolators (by Amber/Booth, Korfund Dynamics or Mason Industries - size as required – with seismic restraint capability ratings as required by the associated seismic zone).

2. Contractor shall supply extra supports as may be required due to size and weight.
3. Additional seismic bracing shall be provided for suspended transformers in seismic zones as required to provide a fully code-compliant installation.

END OF SECTION 26 22 00

SECTION 26 24 16

POWER PANELBOARDS - CIRCUIT BREAKER TYPE

PART 1 - GENERAL

1.1 GENERAL

A. The work under this section includes but is not limited to the following:
1. Power Panelboards
2. Power Circuit Breakers

PART 2 - PRODUCTS

2.1 PANELBOARDS - GENERAL

A. Panelboards shall be dead front type, having lugs only or circuit breaker in mains as shown in panelboard schedule with circuit breaker branches.

B. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on plans. Such rating shall be established by heat rise test with Maximum hot spot temperature on any connector or bus bar not to exceed 50 degrees C rise above ambient at full rated load. Heat rise test shall be conducted in accordance with UL Standard UL67. Bus structure shall be tin-plated aluminum or tin-plated copper. All neutral busses shall be full size. All panelboards shall contain ground buss.

C. Entire panelboard assembly, including all bussing, shall have SCCR ratings meeting or exceeding the minimum AIC ratings listed on the plans for the panel. All ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.

D. Panelboards shall be listed by Underwriters Laboratories and shall bear the UL label. Panelboards shall be suitable for use as service equipment when required.

E. Top/bottom feed arrangement and lug sizes/quantities shall be coordinated by the contractor.

F. Service entrance panelboards shall be provided with barrier such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations**.**

2.2 CIRCUIT BREAKERS

A. Where the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated (or can be adjusted to is 1200A or higher, breakers shall be electronic trip and shall be provided with arc energy-reducing maintenance switching (with local status indicator) to reduce arc flash energy per NEC 240.87 requirements.

B. Circuit breakers shall be quick-make and quick-break, whether actuated automatically or manually. Circuit breakers shall have inverse time tripping characteristics with automatic release which shall trip free of the handle. Circuit breaker handles shall be three distinct positions—“OFF”, “ON”, and “TRIPPED”. When a circuit breaker opens on overload or short circuit, the operating handle shall automatically assume the “TRIPPED” position.

C. Multipole breakers shall be internal common trip with single operating handle. External handle ties are not acceptable, unless specifically noted otherwise (such as for multi-wire branch circuits described below).

D. Circuit breakers feeding multiwire branch circuits (as defined by NEC) consisting of separate single phase loads sharing a common neutral shall be provided with handle ties to simultaneously disconnect all ungrounded conductors per NEC Article 210.4(B). The necessary locations of these handle ties shall be coordinated by the contractor. Where necessary, the contractor may rearrange circuit breakers (as minimally as possible) as required to meet this requirement.

E. Circuit breakers shall be of the bolt-on type.

F. Circuit breakers shall be “FA” frame and larger.

G. All breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated panel. All interrupting ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.

H. The front face of all circuit breakers shall be flush with each other. Breaker numbers shall be permanently attached to trim.

I. All branch circuit breakers shall be listed to UL489 or shall be specially-tested to be HACR listed.

2.3 CABINETS, TRIM AND WIREWAY SPACE

A. Clear space from bottom of lugs to bottom of wireway shall be not less than 6 inches for 400 amps and below, 10 inches for 600 amps, 12 inches for 800 amps and above.

B. Panelboard interiors shall be fastened to cabinets by adjustable aligning supports.

C. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets.

D. Fronts of cabinets shall be made from a single sheet of full finished steel having the door cut out. Doors shall have flush hinges, and lock utilizing all metal construction (with all locks keyed alike). Front shall be attached to cabinets with hinged trim with piano-hinge down full length of one side to allow access to wiring without complete removal of outer trim. Front shall be provided with a metal directory and holder with clear plastic covering welded to the inside of the door. Fronts shall be code gauge full-finished steel with rust inhibiting primer and baked enamel finished in ASA #49 gray. Panelboards installed in exterior or wet locations shall have NEMA 3R enclosures.

E. Each section of multi-section panelboards shall be of matching heights and depths.

F. Panelboard enclosures shall be furnished as shown on panel schedule on plans for surface, flush or motor control center mounting.

2.4 MANUFACTURER

A. Panelboards shall be as manufactured by Square 'D', G.E., Siemens or Cutler Hammer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All panelboard dimensions and clearances shall be carefully checked and coordinated with the proper trades to ensure proper mounting space and support prior to roughing in equipment. In no case shall any circuit breaker be located above 6'-7" A.F.F..

B. Wiring in panelboard gutters shall be done in a neat and workmanlike manner. Wiring shall be grouped into neat bundles and secured with approved tie wraps.

3.2 PERFORMANCE TESTING

A. The ground-fault protection system when provided shall be performance tested after installation by a qualified person(s) using primary current injection in accordance with the instructions provided with the equipment and NEC requirements. A written record of the testing shall be provided.

B. The arc energy reduction protection system when provided shall be performance tested after installation by a qualified person(s) using primary current injection in accordance with the instructions provided with the equipment and NEC requirements. A written record of the testing shall be provided.

3.3 PANEL IDENTIFICATION

A. Refer to Specification Section 26 05 53.

END OF SECTION 26 24 16

SECTION 26 24 17

LIGHTING PANELBOARDS

PART 1 - GENERAL

1.1 GENERAL

A. The work under this section includes but is not limited to the following:
1. Lighting Panelboards
2. Circuit Breakers

PART 2 - PRODUCT

2.1 PANELBOARDS

A. Enclosure:
1. Panelboards shall be dead front type and shall be in accordance with Underwriter's Laboratories, Inc., standard of panelboards and enclosing cabinets and so labeled.
2. Panelboards installed in dry locations shall have enclosures fabricated from sheet steel and shall be finished in ASA #49. Panelboards installed in exterior or wet locations shall have NEMA 3R enclosures.
3. The door shall have a cylinder type lock. Lock shall be held in place by concealed screw to a captive nut, welded to inside of door. All locks shall be keyed alike.
4. A metal framed circuit directory card holder with clear plastic covering shall be factory-mounted on the inside of door.
5. Panels for 20 or more circuits, including spares and spaces, shall be 20 inches wide.
6. Panelboards enclosures shall be as shown on panel schedule on plans for surface, flush or motor control center mounting.
7. Provide hinged trim with piano-hinge down full length of one side to allow access to wiring without complete removal of outer trim.
8. Each section of multi-section panelboards shall be of matching heights and depths.

B. Bussing/Lugs:
1. Ampacity and service voltage of main buss, lugs or main breakers and branch circuit breakers shall be as shown on drawings.
2. All bussing and associated connectors shall be tin-plated aluminum or tin-plated copper.
3. All panelboards shall contain ground buss.
4. Entire panelboard shall be capable of withstanding a short circuit not less than the interrupting capacity of any breaker in the panel. When a power distribution system electrical study (including short circuit stud, etc.) is a part of the project, contractor shall further verify that all proposed equipment is properly rated (per the results of the study) prior to submitting shop drawings. Interrupting ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.
5. Buss connectors shall be for distributed phase arrangement.
6. Top/bottom feed arrangement and lug sizes/quantities shall be coordinated by the contractor.
7. Entire panelboard assembly, including all bussing, shall have SCCR ratings meeting or exceeding the minimum AIC ratings listed on the plans for the panel. When a power distribution system electrical study (including short circuit stud, etc.) is a part of the project, contractor shall further verify that all proposed equipment is properly rated (per the results

of the study) prior to submitting shop drawings. All ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.

8. Service entrance panelboards shall be provided with barrier such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations

C. Breaker arrangement and numbering:
1. Panelboards shall be factory assembled with branch breakers arranged exactly as indicated on plans.
2. Breakers shall be numbered vertically beginning top left. Multi-section panelboards shall be numbered consecutively through all sections.
3. Breaker numbers shall be permanently attached to trim.
4. Main breakers shall be vertically-mounted (branch-mounted or back-fed main breakers will not be acceptable unless specifically so shown on plans).

2.2 CIRCUIT BREAKERS

A. Circuit breakers shall be quick break, quick make, thermal magnetic type, for alternating current. Breakers shall trip free for the handle and tripping shall be indicated by the handle assuming a position between OFF and ON.

B. Circuit breakers shall be of the bolt-on type.

C. Multi-pole breakers shall be internal common trip with single operating handle; external handle ties are not acceptable, unless specifically noted otherwise (such as for multi-wire branch circuits described below).

D. Circuit breakers feeding multiwire branch circuits (as defined by NEC) consisting of separate single phase loads sharing a common neutral shall be provided with multi-pole breakers or handle ties to simultaneously disconnect all ungrounded conductors per NEC Article 210.4(B). The necessary locations of these multi-pole breakers or handle ties shall be coordinated by the contractor. Where necessary, the contractor may rearrange circuit breakers (as minimally as possible) as required to meet this requirement.

E. All breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated panel. All interrupting ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.

F. All branch circuit breakers shall be listed to UL489 or shall be specially-tested to be HACR listed.

2.3 SPECIAL REQUIREMENTS

A. Any special requirements on the drawings, such as for increased interrupting rating, ground fault protection, etc., shall supersede these specifications, but only insofar as that particular requirement is concerned.

B. Lighting panels larger than 400A shall conform to the requirements for power panels.

2.4 MANUFACTURER

A. Panelboards shall be as manufactured by Square 'D', G.E., Siemens or Cutler Hammer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All panelboard dimensions and clearances shall be carefully checked and coordinated with the proper trades to ensure proper mounting space and support prior to roughing in equipment. In no case shall any circuit breaker be located above 6'-7" A.F.F..

B. Wiring in panelboard wireways shall be done in a neat and workmanlike manner. Wiring shall be grouped into neat bundles and secured with approved tie wraps.

C. For all flush-mounted panelboards, a minimum of three (3) one-inch empty conduits shall be stubbed out above the nearest accessible ceiling space for future use.

3.2 PANEL IDENTIFICATION

A. Refer to Specification Section 26 05 53.

END OF SECTION 26 24 17

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Wiring Devices

B. Plates

C. Finishes

PART 2 - PRODUCTS

2.1 WIRING DEVICES AND PLATES

A. Switches shall be AC type, extra-heavy duty industrial grade (unless otherwise shown) of ratings shown on drawings. Switches shall be as manufactured by Hubbell, P & S, Sierra, Bryant, GE, Arrow Hart or equal.

B. Receptacles shall have blade configuration and shall be heavy duty industrial grade (unless otherwise shown) of current and voltage rating as shown on drawings. Receptacles shall be as manufactured by Hubbell, P & S, Sierra, Bryant, GE, Arrow Hart or equal.

C. All GFCI-type receptacles shall continuously self-test and shall trip/deny power if the receptacle does not provide proper GFCI protection or if the line/load terminations are miswired and shall provide visual indication of power status, trip conditions, ground fault conditions and end-of-life status.

D. Each wiring device shall have a plate (see “Finishes” section below for specific requirements).

2.2 FINISHES

A. All wiring devices (switches, receptacles, etc.) shall be colored to match the coverplates described below. For instance, all items covered by stainless steel, aluminum or malleable iron plates shall be gray in color.
   1. Exceptions:
      a. Emergency wiring devices shall be red.
      b. Isolated ground wiring devices shall be orange.

B. Coverplates for recessed, wall-mounted electrical items (switches, receptacles, telephone outlets, etc.) shall be stainless steel unless shown otherwise.

C. Coverplates, trim rings, etc. for recessed, floor-mounted electrical items (floor outlets, underfloor duct junctions, etc.) shall match finish of building hardware (302/304 stainless steel, brass, etc.) in area installed.

D. Coverplates for exposed electrical items (switches, receptacles, telephone outlets, etc.) shall be of same material as exposed boxes (see Outlet Box Specification for required material type) and

shall have beveled edges.

E. Coverplates for receptacles in wet locations shall be metallic, extra-duty, in-use type, rated for wet locations per NEC requirements unless noted otherwise.

F. See “Electrical Identification” specification section for coverplate labeling requirements.

PART 3 - EXECUTION

3.1 GENERAL MOUNTING

A. Symbols on drawings and mounting heights are approximate. The exact locations and mounting heights shall be determined on the job, and it shall be the Contractor's responsibility to coordinate with all trades to secure correct installation. For example, Contractor shall coordinate exact mounting heights over counters, in or above backsplashes, in block walls, and at other specific construction features.

B. Verify all door swings with Architectural. Locate boxes for light switches within four inches of door trim on swing side (not hinge side) of door.

C. Devices and associated plates shall not be used as support; outlet boxes shall be rigidly supported from structural members.

D. Mount all straight-blade receptacles vertically with ground pole up, unless specifically noted otherwise.

E. Unless otherwise shown or required by local handicap codes, outlet boxes shall be the following distances above the finished floor unless otherwise noted.
1. Receptacles and telephone outlets in offices and other finished areas: 1’-6” to the center of the box.
2. Receptacles and telephone outlets in equipment rooms and other unfinished areas: 4’-0” to the center of the box.
3. Receptacles over counters: As Noted
4. Switches, general: 4’-0” to the top of the box.
5. Fire Alarm Pull Stations: 4’-0” to the top of the box.
6. Fire Alarm Audio/Visual Devices: As shown on fire alarm shop drawings (Entire lens shall be above 80” and below 96” per NFPA 72).
7. Push-button, etc., general: 4’-0” to the top of the box.
8. Other device types: verify with engineer prior to rough-in.

END OF SECTION 26 27 26

SECTION 26 28 16

SAFETY SWITCHES AND FUSES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Safety Switches

B. Fuses

C. Branch Feeders

D. Feeders

PART 2 - PRODUCTS

2.1 SAFETY SWITCHES

A. Safety switches shall be quick-make, quick-break, NEMA heavy duty type HD, fused or nonfused as shown. Switch blades shall be fully visible in the off position.

B. Safety switches shall be furnished with transparent internal barrier kits to prevent accidental contact with live parts. Barriers shall provide finger-safe protection when the switch door is open and shall allow use of test probes and removal of fuses without removing barrier.

C. Fused switches shall have provisions for class R, rejection type fuses.

2.2 FUSES (600V)

A. Fuses for all branch switches shall be Bussman Mfg. Co., Dual Element, Class “R” Fusetron.

B. Fuses for main switch/switches shall be Bussman Mfg. Co. Hi-Cap.

2.3 MANUFACTURER

A. Safety switches shall be as manufactured by Square 'D', G.E., Siemens or Cutler Hammer.

B. Fuses shall be as manufactured by Bussman Mfg. Co. or equal.

PART 3 - EXECUTION

3.1 SAFETY SWITCHES

A. Safety switches shall be installed as shown on the plans and in accordance with N.E.C.

B. Locations shown for safety switches on plans are diagrammatical only. Exact locations shall be field coordinated by contractor as required to provide code-required clearances.

C. Switch enclosures shall be rated NEMA I indoors in dry locations and NEMA3R outdoors and in wet areas.

D. Adequate support shall be provided for mounting safety switches. Safety switches shall not be mounted to the associated equipment (unless the safety switch is furnished with the equipment).

3.2 FUSES

A. Fuses shall be sized as shown on drawings, unless a smaller size is required by the associated equipment supplier, in which case the contractor shall provide fuses sized as directed by the associated equipment supplier at no additional cost.

B. Provide not less than one spare set of fuses for each size used. Provide an additional spare set for each five sets of same size fuses used.

END OF SECTION 26 28 16

SECTION 26 43 00

SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes field-mounted SPDs for low-voltage (<1000 V) power distribution and control equipment.

B. The specified unit(s) shall provide effective high energy transient voltage surge suppression, surge current diversion and high frequency noise attenuation in all electrical modes for equipment connected downstream from the facility's meter or load side of the main overcurrent device. The unit(s) shall be connected in parallel with the facility's wiring system.

C. The unit(s) shall be designed and manufactured in North America by a qualified manufacturer of suppression filter system equipment. The qualified manufacturer shall have been engaged in the commercial design and manufacturer of such products for minimum of ten (10) years.

D. All products that are submitted according to these specification will be required to meet this specification in it's entirety for both service and distribution TVSS systems. Any product that is submitted and does not comply with all parts of this specification will be subject to rejection.

1.3 DEFINITIONS

A. VPR: Voltage Protection Rating.

B. SPD: Surge Protective Device(s)

C. $I_{(n)}$: Nominal Discharge Current

1.4 SUBMITTALS

A. See specification section 26 05 00.

B. Product Data: For each type of product indicated. Include:
1. Maximum Single Impulse Surge Current Rating.
2. Surge Life (Repetitive Surge) Rating.
3. UL1449 (Latest Edition) Voltage Protection Ratings (VPR).
4. UL1449 (Latest Edition) Nominal Discharge Current (In).
5. Product dimensions and weights.
6. Furnished specialties and accessories.

C. Qualification Data:

D. Safety Agency File Number.

E. ISO 9001-2008 Certification.

F. ISO 1401-2001 Certification.

G. Operation and Maintenance Data: For SPDs to include all submittal data and any applicable operation and maintenance manuals.

H. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.

B. The unit shall be UL 1449 Listed and CUL Approved as a Surge Protective Device and UL 1283 Listed as an Electromagnetic Interference Filter

C. Provide 2nd party certified data demonstrating SPD response to ANSI/IEEE C62.41.2-2002 standard waveforms when tested according to IEEE C62.45.

D. Comply with NFPA 70.

E. All SPDs provided within this project at the service entrance, distribution panels, and sub-panels shall be from the same manufacturer.

1.6 PROJECT CONDITIONS

A. Service Conditions: Rate SPDs for continuous operation under the following conditions unless otherwise indicated:
1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
2. Operating Temperature: 30 to 150 deg F.
3. Humidity: 0 to 95 percent, non-condensing.
4. Altitude: Less than 13,000 feet above sea level.

1.7 COORDINATION

A. Where field-mounted SPD's are specifically shown on plans, coordinate locations of field-mounted SPDs to allow adequate clearances for maintenance.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Replaceable Protection Modules: 1 of each size and type installed, where field-replaceable modular SPDs are provided.

2. Fuses: 1 of each size and type installed, where field-replaceable fuses are provided.

PART 2 - PRODUCTS

2.1 SURGE PROTECTIVE DEVICES

A. Manufacturer:
1. Integral Devices: Surge Protective Devices shall be as manufactured by the distribution equipment manufacturer (Square D, etc.), or by Surge Suppression Inc. if all of the performance of this specification are met and all UL listing of the equipment manufacturer are met.
2. External Devices (where specifically specified on plans): Surge Protective Devices shall be as manufactured by the distribution equipment manufacturer (Square D, etc.) or Surge Suppression Inc.

B. Each Surge Protective Device shall:
1. Be internal to the associated distribution equipment (without violating any applicable UL listings) unless specifically shown otherwise on plans.
2. Be UL 1449 (Latest Edition) listed.
3. Have short-circuit current rating complying with UL 1449 (Latest Edition), that matches or exceeds the short-circuit rating of the associated distribution equipment.
4. Be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.
5. Have fuses, rated at 200-kA interrupting capacity.
6. Have a minimum UL 1449 Nominal Discharge Current (I_n) Rating of 20kA.
7. Be fabricated using bolted compression lugs.
8. Provide suppression for seven (7) modes of protection.
9. Have LED indicator lights for power and protection status of each phase.
10. Have audible alarm, with silencing switch, to indicate when protection has failed.
11. Have form-C contacts rated at 2 A and 24-V ac minimum, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with facility monitoring and control system if monitoring by that system is required by plans or other specifications.
12. Have six-digit transient-event counter, mounted to front of equipment door, set to totalize transient surges (externally mounted SPD's may have the transient –event counter monted on the visible face of the SPD).
13. Meet all UL 96A requirements (for Lightning Protection Systems) where the device is installed at a service entrance of the facility. At a minimum, these devices shall:
    a. Be marked as Type 1 or Type 2 SPDs with product Identity consisting of "Surge Protective Device" or "SPD", and identifying all ratings so required by UL96A and the 4 digit alpha numeric Control Number.
    b. Have a minimum UL 1449 Nominal Discharge Current (I_n) Rating of 20kA.
    c. Be UL listed and labeled with holographic label.

C. Peak Single-Impulse Surge Current Rating shall be meet the following minimums unless specifically shown otherwise on plans:

Application	Per Phase	Per Mode

Service Entrance Devices	240 kA	120 kA
Downstream Devices	160 kA	80 kA

D. The ANSI/UL 1449 voltage protection rating (VPR) in grounded wye circuits, the SPDs shall not exceed the following:

Modes	**208Y/120V**	**480Y/277V**	**600Y/347V**
L-N,L-G, N-G	800	1200	1500
L-L	1200	2000	2500

E. The ANSI /UL 1449 VPR for 240/120 V, 3-wire or 4-wire circuits with high leg shall not exceed the following:

Modes	**240/120V**
L-N,L-G, N-G	1200/800

2.2 ENCLOSURES

A. Where external units are specifically specified on plans, units not mounted within electrical distribution equipment (such as switchboards, MCC's, etc.) shall be provided in enclosures with NEMA enclosure ratings that match or exceed the NEMA enclosure ratings of the equipment from which the units are fed. For example, a unit fed from a NEMA 4X stainless steel panelboard shall also be mounted within a NEMA 4X stainless steel enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All SPD's shall be integrally-mounted within the associated distribution equipment unless specifically shown otherwise on plans.

B. Install SPDs at service entrance on load side, with ground lead bonded to service entrance ground.

C. Install SPDs downstream of the service entrance with conductors or buses between suppressor and points of attachment as short and straight as possible. The lead lengths between the TVSS unit and the equipment being protected shall not exceed fourteen (14) inches without approval from the engineer. Do not bond neutral and ground. Leads shall be as straight as possible with no sharp bends.

D. Where externally-mounted SPD's are specifically shown on plans, provide circuit breaker as directed by the SPD supplier as a dedicated disconnecting means for SPD unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

A. Ensure that interiors are free of foreign materials and dirt.

B. Check and test switches, pushbuttons, meters for proper operation.

C. Check and test indicating lights for proper operation and color.

D. Perform manufacturer's on site field test procedures.

3.3 STARTUP SERVICE

A. Do not perform insulation resistance (MEGGER) tests of the distribution wiring equipment with the SPDs installed. Disconnect all wires, including neutral, before conducting insulation resistance tests, and reconnect immediately after the testing is over.

3.4 SYSTEM WARRANTY

A. The SPD system manufacturer shall warranty the entire SPD system against defective materials and workmanship for a period of ten (10) years from the date of substantial completion. This warranty is in effect as long as the unit is installed in compliance with the manufacturer's installation, operation, and maintenance manual, UL Listing requirements, and any applicable national or local electrical codes.

B. Any SPD device which shows evidence of failure or incorrect operation, including damage as the result of lightning strikes, during the warranty period shall be replaced by the manufacturer at no charge to the owner. Warranty will provide for multiple exchanges of any inoperable devices at any time during the warranty period which starts at the date of substantial completion of the system to which the surge suppressor is installed.

C. The manufacturer is required to have a nationwide network of factory-authorized local service representatives for repair and service of this product. The manufacturer shall have a dedicated 1-800 telephone number for service problems and questions. This number shall be manned by a knowledgeable factory employee to ensure prompt response to any emergency situation that may arise.

END OF SECTION 26 43 00

SECTION 26 50 00

LIGHTING MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Lighting Fixtures

B. Drivers

1.2 SUBMITTALS

A. Complete submittals shall be provided identifying all lighting fixture types and options, all lamp types (where applicable) and compliance with all contract requirements. The absence of clear submittal information specifically listing exceptions/deviations from detailed contract requirements will be understood to indicated that the contractor/supplier intends to meet all contract requirements. Refer to specification section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 GENERAL

A. Lighting fixtures shall be furnished as shown on plans and specified herein. It shall specifically be the responsibility of Contractor to verify exact types ceilings, walls, etc. and recessing depth of all recessed fixtures and furnish the specific mounting trims and accessories of the specified and/or accepted fixture specifically for the ceiling, wall etc. in which each fixture is to be installed.

B. Base bid manufacturers are listed on the lighting fixture schedule. Manufacturers listed without accompanying catalog numbers are responsible for meeting the quality standards, efficiency, maximum wattages and photometric distributions set by the specified product.

C. All lighting fixtures shall be so designed and shall have drivers and other similar items so installed as to function without interruptions or failures when operating in the environment in which they are proposed to be installed. Special attention shall be given to environments with potentially high ambient temperatures such as attic spaces, exterior soffits, confined interior soffits, coves, unconditioned spaces, etc. and shall be addressed by providing fixtures with suitable high ambient temperature ratings, remote mounting of drivers/ballasts, providing approved ventilation, etc. as directed by fixture manufacturer and approved by engineer, at contractor’s expense.

D. All fixtures installed such as to create penetrations through fire rated ceiling or wall assemblies shall be labeled as suitable for that purpose or installed with covers, tenting or other means as required to maintain the fire rating of the assembly.

2.2 LED LUMINAIRES

A. For the purpose of these specifications, LED Luminaires shall be defined as the entire LED fixture assembly including LED array, drivers, housing, electronics, etc. that compose the lighting fixture.

B. Furnish and install LED Luminaire of proper size, type, efficacy, delivered lumen output, color temperature, distribution pattern, operational life, and CRI as shown on drawings.

C. LED Luminaires shall be tested in accordance with LM-79 and LM-80 standards.

D. LED drivers shall comply with NEMA 410 standards for inrush current, etc.

E. Exterior, pole mounted LED Luminaires shall be provided with an easily-serviceable, UL recognized surge protection device that meets a minimum 10kA Category C Low operation (IECC C62.41.2-2002). Device shall be wired in front of light engine(s) and driver(s) and shall fail "open" such as to prevent fixture operation after a surge protection failure.

F. LED Luminaires shall have a guarantee-warranty of at least five years unless specifically noted otherwise on contract documents.

G. LED Luminaire assembly shall comply with ambient temperature requirements specified in General section above.

2.3 STEMS/PENDANTS

A. Hangers shall be approved ball aligner type swivel, 30 degrees from vertical with swivel below canopy.

B. Stems/Pendants shall be rigid or IMC conduit unless specified otherwise on plans. Proposed stem/pendant types shall be submitted for review prior to shipment of light fixtures from factory.

C. Stems/Pendants shall be provided as required to prevent swaying of fixtures due to HVAC system airflow or other similar occurrences.

D. Shall be painted the same color as the fixture trim unless noted otherwise.

2.4 MANUFACTURER

A. Fixtures and stems shall be manufactured as shown in fixture schedule or approved equals.

B. Drivers shall be as manufactured by Philips/Advance, GE, Lutron, Magnatec, Motorola, EldoLED or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION OF LIGHTING FIXTURES

A. Support:
1. Support of all lighting fixtures shall be responsibility of electrical contractor. All lighting fixture supports shall be installed in accordance with lighting fixture supplier's recommendations.
2. Contractor shall coordinate installation requirements for all wall-mounted fixtures (especially for wall-mounted fixtures on uneven wall surfaces, etc.) as required to assure a level/flat mounting surface and level/plumb/secure finished installation. Contractor shall provide flat mounting plates or other mounting provisions where necessary. Any proposed

mounting plates, etc. shall be submitted to and approved by project architect prior to ordering materials.
3. Fixtures shall be supported independent of ceiling from structural members of building.
4. Lay-in fixtures shall be supported by four (4) taut 12 gauge hanger wires connected from each corner of the fixture to the structure above so that fixture is supported independent of the ceiling.
5. Other recessed light fixtures (including recessed downlights) shall be supported with two (2) taut 12 gauge hanger wires connected from opposing corners of the light fixture to the structure above so that fixture is supported independent of the ceiling.
6. Pendant mounted fixtures shall be directly supported from the structure above using a 9 gauge hanger wire or an approved alternate support without using the ceiling suspension system for direct support.
7. Tandem fixtures may utilize common hanger wires.
8. All lay-in fixtures shall be attached to ceiling grid by means of approved clips and in accordance with the N.E.C.
9. Contractor shall submit typical hanging detail to Engineer before installing any fixtures.

B. Connections:
1. All grid fixtures shall be wired by flex individually to junction and not wired fixture to fixture.
2. All flex shall contain 3 conductors (3rd wire ground). Ground wire shall be securely grounded at each end. Other conductors shall be connected by approved connectors.

C. Row-Mounted fixtures:
1. All stems on row-mounted fluorescent fixtures shall be installed as follows (except fixtures with slide grip hangers):
   a. One stem shall be installed in the first fixture knockout from end of row (on the first and last fixture of the row).
   b. One stem shall be installed between each two fixtures. Stem shall center joint where fixtures join and shall attach by use of "joining plates".
2. All fixtures in continuous rows other than recessed grid type shall be connected by nipples with locknuts bushings.

D. Coordination:
1. Contractor shall coordinate all dimensions & locations of light fixtures prior to rough-in to ensure proper fit and coordination with other trades.
2. Contractor shall verify exact location of light fixture with Reflected Ceiling Plan. If there are any discrepancies, verify exact location with architect.
3. Contractor shall verify exact ceiling types being installed and shall adjust fixture trim types accordingly (prior to submitting light fixture shop drawings).

END OF SECTION 26 50 00

SECTION 27 05 00

AUXILIARY SYSTEM CABLES, 0-50V

PART 1 - GENERAL

1.1 DESCRIPTION

A. Cables rated for 0V-50V application

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless specified otherwise, all cables within the scope of this specification section shall:
1. Be rated for exposed cable tray installation.
2. Be plenum rated.
3. Be UL-rated for the proposed application.
4. Be multi-conductor with overall outer sheath as required by the application. The insulation of each conductor within the overall multi-conductor cable shall be uniquely color-coded. Ground conductors (when provided) within the multi-conductor cable shall have green insulation. Conductors with green insulation shall not be used for conductors other than ground.
5. Utilize copper conductors.
6. Have wire gauge as required to limit voltage drop to acceptable limits determined by the system supplier and to meet all applicable code requirements.
7. Where installed underground, within slab-on-grade or in exterior locations, be rated for wet locations.
8. Where required for specific systems, meet the specific requirements (conductor quantity, wire gauge, insulation type, shielding, etc.) of the system supplier.

2.2 CLASS 1 CONTROL CABLING (120VAC CONTROL CIRCUITS, ETC.)

A. In addition to above requirements, and unless specified otherwise, Class 1 control cabling shall:
1. Be rated for 600V.
2. Be industrial grade.
3. Have stranded conductors.
4. Have sunlight/oil-resistant PVC/Nylon insulation and jacket with ripcord.
5. Be manufactured by Belden, AlphaWire or General Cable.

2.3 CLASS 2 & 3 CONTROL CABLING (FED FROM CLASS 2 OR 3 POWER SUPPLIES)

A. In addition to above requirements, and unless specified otherwise, Class 2 & 3 control cabling shall:
1. Be rated for 300V.
2. Be shielded if so recommended by the system supplier/integrator.
3. Have twisted conductors.
4. Have plenum-rated insulation/jacket with ripcord.
5. Be manufactured by AlphaWire, Belden, General Cable, Superior Essex or West Penn.

2.4 NETWORK CABLING

A. Furnish and install all Ethernet, Fiber Optic and Backbone Copper Telephone cabling in accordance with all BICSI requirements and in accordance with other applicable specification sections.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Routing:
1. All wires and cables shall be installed in conduit unless specifically noted otherwise. Where conduit is not otherwise required by contract documents, 0-50V Cabling located within concealed, accessible ceiling spaces (such as above lay-in ceilings) may be run without conduit if the following requirements are met:
   a. Cabling is plenum-rated, multi-conductor.
   b. Cabling is supported by cable tray or with J-hook supports on intervals not to exceed 5'-0" on center. Cabling shall be supported solely from the cable tray or j-hooks supported from the building structure, without using piping, ductwork, conduit or other items as supports.
   c. Cabling is neatly formed, bundled and tied with plenum-rated Velcro straps on intervals not to exceed 30" on center.
   d. Properly-sized conduit(s) are provided wherever cabling enters an inaccessible or exposed area (such as above gyp board ceilings, within walls or through walls).
   e. Cabling is not a part of a Fire Alarm System, Smoke Control System, Emergency Generator Control System or other life-safety related system.
2. End bushings shall be provided on both ends of all raceway terminations.
3. No splices shall be pulled into conduit.
4. No cabling shall be pulled until conduit is cleaned of all foreign matter.

B. Penetrations:
1. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly.
2. For cabling not installed in conduit:
   a. Fire/smoke barrier penetrations shall be sealed utilizing an enclosed fire-rated pathway device (STI EZ Path or equal) containing a built-in fire sealing system sufficient to maintain the hourly fire rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed or retrofitted without the need to remove or reinstall firestop materials. The pathway shall be UL Classified and tested to the requirements of applicable ASTM/UL1479 standards.
3. For cabling installed within conduit from endpoint to endpoint:
   a. Fire/smoke barrier penetrations shall sealed utilizing fire caulk or other equivalent firestop systems around perimeters of conduits per UL requirements.
4. For cabling installed within cable trays:
   a. Fire/smoke barrier penetrations shall be sealed with one of the following methods:
      1) Continuous cable tray through the penetration, with a combination of large firestop pillows and small firestop pillows contained, supported and secured (to prevent unauthorized removal) on both sides by aluminum wire mesh and firestop putty. Firestop pillows shall be STI Series SSB or equal and Firestop putty shall be STI Spec Seal or equal.
      2) Cable tray broken at the penetration, with fire/smoke barrier penetrations sealed utilizing an enclosed fire-rated pathway device (STI EZ Path or equal) containing

a built-in fire sealing system sufficient to maintain the hourly fire rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed or retrofitted without the need to remove or reinstall firestop materials. The pathway shall be UL Classified and tested to the requirements of applicable ASTM/UL1479 standards.

C. Excess Cabling:
1. Excess cabling shall be neatly coiled within all junction boxes, pullboxes, wireways, etc. and at all terminations as required to allow future re-termination of cabling.

D. Terminations:
1. All conductors/cabling (including spare conductors) shall be properly terminated unless specifically directed otherwise. See below for general termination hardware requirements.
2. Cabling shall be neatly formed, bundled and tied at all terminations.

3.2 SPLICES/CONNECTIONS/TERMINATIONS:

A. Network Cabling:
1. Network and fiber optic cabling shall be continuous from endpoint to endpoint and shall not be spliced unless specifically noted otherwise.

B. Control Cabling:
1. Connections shall be made with T & B Sta-Kon wire joints EPT66M, complete with insulating caps. To be installed with WT161 Tool or C nest of WT11M Tool, Ideal Super - Nuts (not wire nuts), Ideal Wing Nuts, or Buchanan Elec. Products B Cap or Series 2000 Pressure connectors complete with nylon snap on insulators to be installed with C24 pressure tool.

C. Shielded cabling:
1. Unless directed otherwise by the system supplier, 0-50V cable shielding shall be grounded at the PLC/control panel end only (not at the field device end) with a termination kit as directed by the PLC/control panel supplier.
2. Shielded cabling shall be continuous from endpoint to endpoint and shall not be spliced without prior written approval from the Engineer.

3.3 LABELING

A. Refer to Specification Section 26 05 53 for all labeling requirements.

END OF SECTION 27 05 00

SECTION 27 10 00

STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

1.1 SCOPE:

A. This document describes the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Backbone and Horizontal cabling comprised of copper and fiber cabling, and support systems are covered under this document.

B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the structured cabling contractor as detailed in this document.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types are indicated on the plans. If the bid documents are in conflict, this specification shall take precedence.

D. Refer to Specification Section 26 05 53 (Electrical Identification) for additional identification requirements.

E. Refer to Specification Section 27 05 00 (Auxiliary System Cables, 0-50V) for additional material and installation requirements.

1.2 REGULATORY REFERENCES:

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the National Electrical Code, local ordinances and present manufacturing standards.

B. All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

C. All modular jacks, patch cords, consolidation point, and patch cords shall be ETL Verified (not just tested) to be category 6 component and channel compliant.

D. The cabling system described in this specification is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:

1. ANSI/TIA/EIA - 568-B.1, Commercial Building Telecommunications Cabling Standard Part 1: General Requirements, April, 2001
2. ANSI/TIA/EIA - 568-B.2, Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components, April, 2001
3. ANSI/TIA/EIA - 568-B.2-1, Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components, Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ω Category 6 Cabling

4. ANSI/TIA/EIA - 568-B.3, Commercial Building Telecommunications Cabling Standard Part 3: Optical Fiber Cabling Components, March, 2000
5. ANSI/TIA/EIA – 569-E, Commercial Building Standard for Telecommunications Pathways and Spaces, 2019
6. ANSI/TIA/EIA – 606-A, Administration Standard for Telecommunications Infrastructure of Commercial Buildings, February, 2002
7. ANSI/TIA/EIA – 607-AJ, Commercial Building Grounding and Bonding Requirements for Telecommunications, August 1994
8. ANSI/ TIA/EIA – 758, Customer-Owned Outside Plant Telecommunications Cabling Standard, April 1999
9. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM) 10TH edition.
10. National Fire Protection Agency (NFPA – 70), National Electrical Code (NEC) –2002
11. ANSI/TIA/EIA – 45-B, Test Procedures for Fiber Optic Connections.
12. ANSI/TIA/EIA – 526-14, Power Test for Fiber Runs.
13. FCC 47 CFR 68
14. NEMA 250
15. NEC Articles 770 and 800
16. ADA, Americans with Disabilities Act

E. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release.

F. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project. All local State and federal codes are to be followed.

1.3 APPROVED CONTRACTOR:

A. The Structured Cabling Contractor must meet the following requirements:
1. Contractor must have a certified RCDD on staff. The project manager for this project shall have an RCDD certification, and RCDD shall be responsible for reviewing all aspects of the design, submittals and installation of all products.
2. All required submittal information shall be stamped by the RCDD.
3. Contractor must have a minimum of 3 years experience with projects of similar size and scope to this project.
4. The company performing the work must have been in business for a minimum of 3 years.
5. The company must have an office within 75 miles of the job site.

B. The Structured cabling contractor is responsible for workmanship and installation practices in accordance with the requirements of the standards described in these specifications and manufacturer's requirements.

1.4 WORK INCLUDED:

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The structured cabling contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not.

B. The work shall include, but not be limited to the following:
1. Furnish and install a complete telecommunications wiring infrastructure.
2. Furnish, install, and terminate all UTP and Optical Fiber cable
3. Furnish and install all wall plates, jacks, patch panels, and patch cords at equipment racks and at work outlets (unless shown otherwise on plans).
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Perform channel testing (100% of horizontal and/or backbone links/channels) and certification of all components.
7. Furnish test results of all cabling to the owner on disk and paper format, listed by each closet, then by workstation ID.
8. Provide owner test results and documentation. (Testing documentation and As-built drawings)

1.5 SUBMITTALS:

A. Within thirty (30) days of notice to proceed the structured cabling contractor shall submit the following items:
1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.
2. Submit proof from manufacturer of contractor's good standing in manufacturer's certification program.
3. Submit copy of contractor's RCDD certification.
4. Submit listing of five (5) projects of similar size and scope to this project that have been completed within the last five years. Include in this submittal owner's contact information for each project.
5. Submit letter from the manufacturer stating that the manufacturer will provide a twenty-five year (25) warranty in accordance with the requirements paragraph 1.03 (B) of these specifications.
6. Submit appropriate cut sheets and samples for all products, hardware and cabling.
7. Submit 1/8" = 1'-0" drawings of floor plans indicating all work outlets and the labeling designation for each jack.
8. Submit ½" = 1'-0" drawings of each MDF and each IDF showing all racks, patch panels, 110 blocks, etc.

B. Work shall not proceed without the engineer's approval of the submitted items.

C. The structured cabling contractor shall receive approval from the engineer on all substitutions of material. No substituted materials shall be installed except by written approval from the engineer.

1.6 DRAWINGS:

A. It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the structured cabling contractor in bidding the job. The structured cabling contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.

B. The structured cabling contractor shall verify all dimensions at the site and be responsible for their accuracy.

PART 2 - PRODUCTS

2.1 EQUIVALENT PRODUCTS:

A. Due to the nature and type of communications all products, including but not limited to faceplates, jacks, patch panels, racks, 110 blocks, and patch cords, for the purpose of this document, shall be manufactured by Hubbell, Ortronix, Panduit, Amp or Systimax. See below for acceptable cable manufacturers.

2.2 WORK AREA OUTLETS:

A. Work area cables shall each be terminated at their designated work area location in the connector types described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.

B. The Telecommunications Outlet Assembly shall accommodate:
1. A minimum of two (2) modular jacks
2. Additional accommodations for specific locations as noted in the plans for optical fiber and/or additional copper cables as necessary
3. A blank filler will be installed when extra ports are not used.
4. A dust cap shall be provided on all modular jacks with the circuit number on the identifier strip.
5. Multiple jacks will be placed as documented on the plans.
6. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the structured cabling contractor shall submit the proposed configuration for each outlet assembly for review by the architect.
7. The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA/EIA-606-A standard specifications. Labels shall be printed using a printer such as a Brady hand held printer. Hand printed labels shall not be accepted.

C. Faceplates: The faceplates shall:
1. be UL listed and CSA certified.
2. be constructed of stainless steel (except where noted otherwise). All faceplate colors/materials in public areas shall be approved by the architect. In all cases the material and color of the faceplate shall match the adjacent electrical faceplate.
3. (where plastic faceplates are specifically allowed by the architect/engineer) shall match the faceplate color used for other utilities in the building or match the color of the raceway if installed in surface raceway.
4. be compliant with the above requirements along with the following when incorporating optical fiber:
    a. be a low profile assembly,
    b. incorporate a mechanism for storage of cable and fiber slack needed for termination,
    c. position the fiber optic couplings to face downward or at a downward angle to prevent contamination and,
    d. incorporate a shroud that protects the optical couplings from impact damage.
5. be available as single-gang or dual-gang.
6. possess recessed designation windows to facilitate labeling and identification.
7. shall include a clear plastic cover to protect labels in the designation window.
8. have mounting screws located under recessed designation windows.
9. comply with ANSI/TIA/EIA–606-A work area labeling standard.

10. allow for the UTP modules to be inverted in place for termination purposes.
11. be manufactured by an ISO 9001 registered company.

D. Voice / Data Jacks
1. Voice/Data jacks shall be 8-position modular jacks and shall be Category 6 performance as defined by the references in this document including ANSI/TIA/EIA-568-B.2-1. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. Modular jack performance shall be third-party verified by a nationally recognized independent testing laboratory including, but not limited to, ETL.
2. The wiring scheme shall be T568A or T568B as directed by the owner.
3. The modular jack shall use dual reactance modular contact array.
4. The modular jack shall have low emission IDC contacts.
5. The modular jack shall use standard termination practice using 110 impact tool
6. The modular jack shall be backwards compatible to Category 3 and 5.
7. The modular jack shall be center tuned to category 6 test specifications.
8. Dust cover shall be used on each termination.

2.3 110 COPPER TERMINATION BLOCK:

A. The voice cross connect shall be a passive connection between the horizontal termination blocks and the backbone termination blocks. The wall mount frames shall be field terminated kits including all blocks, connecting blocks, and designation strips. Management rings shall be mounted between vertical columns of blocks to provide management of cross-connect wire. Backbone and horizontal blocks shall use 4-pair connecting blocks. Blocks shall be oriented so that backbone terminations are located on the left and horizontal frames are located on the right of the termination field when facing the frame assembly.

B. 110 Block Kits shall
1. include both the wiring block and connecting block in a 50, 100 and 300 pair footprint as required
2. be manufactured using fire retardant molded plastic.
3. include 4-pair 110C connecting blocks for field termination.
4. support termination of 22-24 AWG solid conductor
5. wiring blocks shall contain back openings for the feed through of cable
6. meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory
7. have color-coded tips on the wiring block and color coding on the connector blocks for installation identification.
8. shall use standard termination practice requiring a single conductor 110 impact tool
9. Termination hardware shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
10. be backwards compatible to category 3 and 5.
11. be labeled in compliance with ANSI/TIA/EIA-606-A labeling specifications using permanent labels and label printer.
12. be manufactured by an ISO 9001 registered company.

2.4 MODULAR PATCH PANELS:

A. The Modular Patch Panels shall
1. be modular design.

2. meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory
3. use low emission IDC contacts
4. use dual reactance technology to enhance the signal-to-noise ratio
5. require standard termination practices using a 110 impact tool
6. use a single piece IDC housing designed to accept larger Category 6 conductors
7. support both T568B and T568A wiring
8. include easy to follow wiring labels
9. include label fields
10. allow for the use of icons
11. include full length metal rear cable management
12. be available in standard or high density
13. be backward compatible to category 3 and 5.
14. be center tuned to category 6 test specifications
15. be sized to accommodate number of data or data and phone cables (where phone cables are terminated on patch panels in lieu of 110 blocks) served by each equipment room plus 30% spare capacity.
16. be separated by horizontal cable management sections.

2.5 RACKS:

A. The equipment rack shall provide vertical cable management and support for the patch cords at the front of the rack and wire management, support, and protection for the horizontal cables inside the legs of the rack.

B. Waterfall cable management shall be provided at the top of the rack for patch cords and for horizontal cables entering the rack channels for protection and to maintain proper bend radius and cable support. Double-sided wire management shall also be mounted above each patch panel and/or piece of equipment on the rack. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack. Velcro cable ties shall be provided inside the rack channels to support the horizontal cable. Rack shall be black in color to match the patch panels and cable management.

C. Free-Standing Racks shall:
1. have a minimum capacity of 45U
2. have the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-B.
3. have top cable trough with waterfall and built in patch/horizontal cable distribution separator.
4. have horizontal front and rear cable management above, below and between each 48-port patch panel.
5. have a rack-mounted power strip.
6. have EIA hole pattern on front and rear.
7. be available with a 6.0” channel depth.
8. be available with hook and loop straps for securing bulk cables inside the vertical U-channels.
9. assemble as 19” (483 mm) or 23” (584 mm) with no additional hardware.
10. be available with three styles of vertical patch cord management: interbay with latches, cable management rings, or fingerduct with covers.
11. provide floor and ceiling access for cable management and distribution.
12. provide pre-drilled base for floor attachment of rack.

13. be available in standard color of black.
14. be manufactured by an ISO 9001 registered company.

D. Wall-Mounted Racks shall:
1. provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-B.
2. have top cable trough with waterfall and built in patch/horizontal cable distribution separator.
3. have horizontal front and rear cable management above, below and between each 48-port patch panel.
4. have a rack-mounted power strip.
5. have EIA hole pattern on front and rear.
6. be available with a 6.0" channel depth.
7. be available with hook and loop straps for securing bulk cables inside the vertical U-channels.
8. assemble as 19" (483 mm) or 23" (584 mm) with no additional hardware.
9. provide usable depth as required for standard network ethernet switch and other equipment
10. be available with three styles of vertical patch cord management: interbay with latches, cable management rings, or fingerduct with covers.
11. provide floor and ceiling access for cable management and distribution.
12. provide pre-drilled base for wall attachment of rack.
13. be available in standard color of black.
14. be manufactured by an ISO 9001 registered company.
15. be constructed to swing-out from wall (for rear access) via heavy-duty hinged corner and configurable for either left or right opening.

2.6 HORIZONTAL DISTRIBUTION CABLE:

A. Horizontal Distribution Cabling shall meet the following requirements:
1. Shall be 100 Ohm Enhanced Category 6 Unshielded Twisted Pair (UTP) Cable.
2. Physical Characteristics:
   a. Unless directed otherwise by owner (contractor shall verify with owner), Cat6 cable coloring shall be based on system type as follows, unless specifically approved otherwise:
      1) Data (or IP Voice): Blue
      2) Analog Voice: Grey
      3) Lighting Control System: White
      4) Fire Alarm or other Life-Safety System: Red
      5) CCTV Surveillance Cameras: Yellow
      6) Other: As directed by owner
   b. Shall be plenum-rated.
   c. Shall meet applicable requirements of ANSI/ICEA S-80-576.
   d. The diameter of the insulated conductor shall be .023 in. maximum.
   e. Shall consist of (4) 22-26 AWG twisted pairs.
   f. The overall diameter of the cable shall be no larger than 0.240 inches.
   g. The ultimate breaking strength measured in accordance with ASTM D 4565 shall be 400 N minimum.
   h. Cable shall withstand a bend radius of 1 inch at -20 degrees Celsius without jacket or insulation cracking.
   i. Cable shall be third party verified to meet ANSI/TIA/EIA-568-B.2-1.

j. Where installed underground, within slab-on-grade or in exterior locations, be gel-filled and rated for wet locations.

3. Transmission Characteristics:
   a. DC resistance of any conductor shall not exceed 9.38 Ohms per 100m max. at 20° C. Measured in accordance with ASTM D 4566.
   b. The mutual capacitance of any pair at 1 kHz for 100m of cable shall not exceed 4.4 nF nominal.
   c. DC resistance unbalance any two conductors of any pair shall not exceed 5% when measured at or corrected to 20° C in accordance with ASTM D 4566.
   d. Structural return loss swept measurement for 100m or longer shall meet or exceed Category 6 requirements.
4. Shall be manufactured by Amp NetConnect, Berk-Tek, Leviton, General Cable, Mohawk or Superior Essex.

2.7 BACKBONE - FIBER:

A. Backbone Fiber Optic Cabling shall meet the following requirements:
1. All optical fiber shall be Indoor/Outdoor,Tight-Buffered, All-Dielectric, Plenum rated (unless specified otherwise on plans) with Enhanced Multimode OM4-rated 50/125 Optical Fibers.
2. Each Multimode Fiber shall:
   a. Be graded-index optical fiber wave-guide with nominal 50/125µm-core/cladding diameter.
   b. Comply with ANSI/EIA/TIA-492AAAC-A
   c. Have attenuation measured in accordance with ANSI/EIA/TIA-455-46, 53 or 61.
   d. Have information transmission capacity measured in accordance with ANSI/EIA/TIA-455-51 or 30.
   e. Have measurements performed at 23 degrees C +/- 5 degrees.
   f. Have Maximum attenuation dB/Km @ 850/1300 nm: 3.5/1.0
   g. Have bandwidth $\geq$ 4700 MHz-km @ 850nm. (EMB)
   h. Have bandwidth $\geq$ 500 MHz-km @ 1300nm.
   i. Be laser optimized and guarantee a 1 Gb/s distance of 1000 meters @ 850nm and 10 Gb/s at 600 meters @ 850nm.
   j. Terminate on fiber patch panel using SC Type fiber connectors.
3. Each indoor/outdoor fiber optic cable shall:
   a. Be suitable for use in both outdoor and indoor applications without the use of a transition at the building entrance.
   b. Be suitable for use in risers, plenums and horizontal applications.
   c. Have a dry water blocking system for cable.
   d. Have a fiber strand count of 12 (unless shown otherwise on plans).
   e. Have a nominal 2.21 mm sub-unit diameter.
   f. Have and be marked with an UL-OFNP Flame Rating (unless engineer specified otherwise on plans).
   g. Comply with Bellcore GR-409 and GR20
   h. Be independently verified to comply with ICEA S-104-696
   i. Have strength members of FGE/Aramid yarn.
   j. Be suitable for underground or above ground conduits.
   k. (Where applicable) Have Tight Buffered fibers color coded in accordance with EIA / TIA 598 with an overall black jacket.
   l. Be suitable for operation between -40° to +70° C
   m. Be UV resistant

n. Be of an all dielectric design
4. Shall be manufactured by Berk-Tek, Corning, General Cable or Superior Essex.

2.8 BACKBONE - COPPER:

A. Backbone Copper Cabling shall meet the following requirements:
1. Shall be Cat 3 rated.
2. Shall be RDUP PE-39 rated.
3. Where installed underground or in wet locations, shall include fully-flooded waterblocking compound to provide wet-location rating of cable.
4. Size of the backbone cables shall be determined by multiplying the number of horizontal voice cables to be terminated in each IDF by 200% and rounding up to the nearest 50 pair group. For Example if 94 horizontal voice cables are to be terminated in IDF1, install 94 x 1 pr x 200% = 188 pr rounded up to nearest 50 pr = 200 pr cable to IDF1.
5. Shall be manufactured by Berk-Tek, Corning, General Cable, Mohawk or Superior Essex.

2.9 COPPER CABLE SURGE PROTECTION DEVICES:

A. All copper circuits routed between or outside of buildings shall be provided with a surge protection device at each end. The surge protection device shall be labeled as meeting the requirements of the latest edition of UL 96A (exact requirements shall be coordinated with the lightning protection system supplier, where applicable).

B. The surge protection device shall be connected with a #6 AWG copper bonding conductor between the protector ground lug and the TC ground point.

2.10 PATCH CORDS:

A. The structured cabling contractor shall provide factory terminated and tested UTP and optical fiber patch cords and equipment cords for the complete cabling system. Patch cords shall be provided by the structured cabling contractor to connect patch panels to owner furnished electronics. The UTP patch cables shall meet the requirements of ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2-1 for patch cord testing. Provide one set of optical fiber patch cables per fiber run that terminates on fiber patch panel and provide one category 6 patch cord for each category 6 work outlet that terminates on patch panel.

B. Copper (UTP) patch cords shall:
1. Be furnished to connect each patch panel jack to owner supplied electronics.
2. Be furnished for each work outlet jack.
3. Be a Category 6 patch cord manufactured by Panduit, Amp or Systimax.
4. Use 8 position connector with impedance matched contacts and designed using dual reactance.
5. Be constructed of 100 ohm, 4 pair, 24 AWG, stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2–1 standard.
6. Meet TIA category 6 component specifications in ANSI/TIA/EIA-568-B.2-1 100% factory tested to meet category 6 performance and ETL or any other nationally recognized 3rd party verification
7. Be capable of universal T568A or T568B wiring schemes.
8. Have modular connector that shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
9. Have a performance marking indelibly labeled on the jacket (by the manufacturer).

10. Have the ability to accept color-coded labels and icons to comply with ANSI/TIA/EIA-606-A labeling specifications.
11. Have "snagless" protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief
12. Be available in three standard colors
13. Be available in 3 foot, 5 foot, 7 foot, 10 foot, and 14 foot standard lengths
14. Be backwards compatible to Category 3, 5 and 5e

C. Fiber Optic patch cords shall:
1. Be furnished in the quantity of two (2) per IDF in each IDF and two (2) per IDF in each MDF.
2. Be manufactured by Panduit, Amp or Systimax.
3. Be multimode OM4 type.
4. Have connector type as directed by owner.
5. Have a performance marking indelibly labeled on the jacket (by the manufacturer).
6. Have the ability to accept color-coded labels and icons to comply with ANSI/TIA/EIA-606-A labeling specifications.
7. Be available in three standard colors
8. Be available in 3 foot, 5 foot, 7 foot, 10 foot, and 14 foot standard lengths

2.11 GROUNDING AND BONDING:

A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.

B. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications room shall be provided with a telecommunications ground bus bar (TGB). Each grounding bus shall be 12"W x 4"H x ¼"THK and be mounted to the backboard with porcelain isolators.

C. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

2.12 FIRESTOP:

A. A firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an UL listed firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

2.13 INNERDUCT:

A. Innerduct, shall be:
1. Non-metallic, corrugated with pre-installed pull tape.
2. Plenum-rated, where installed within buildings.
3. UL listed for the application.
4. Size as required by the application.
5. Orange in color in concealed areas or within telecommunications or electrical rooms. Color shall be custom as selected by owner in exposed areas (such as within cable trays overhead in areas without ceilings outside telecommunications/electrical rooms).

PART 3 - EXECUTION

3.1 PRE-INSTALLATION SITE SURVEY:

A. Prior to start of work, meet at the project site with the owner's representative and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the General Contractor will be necessary to plan the crucial schedule completions of the equipment rooms and telecommunication closets.

B. Examine areas and conditions under which the system is to be installed. Do not proceed with work until satisfactory conditions have been achieved.

3.2 WORK AREA OUTLETS:

A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12" of UTP and 36" of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B.1 document, manufacturer's recommendations and best industry practices.

C. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

D. Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the cable.

E. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

F. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

G. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.3 HORIZONTAL DISTRIBUTION CABLE INSTALLATION:

A. All horizontal voice and data cabling shall be terminated on modular patch panels except for horizontal voice cables serving life safety related functions (fire alarm systems, security systems, elevator communications, etc.). All horizontal voice cabling serving life safety related functions shall be terminated on 110 blocks.

B. The voice and data cables shall be installed in separate patch panels.

C. All wiring above ceilings shall be installed in cable tray or open top cable hangers or in provided conduit.

D. Cable above accessible ceilings shall be supported 60” on center from cable support attached to building structure.

E. Do not untwist cable pairs more than 0.5 in. when terminating.

F. The Contractor shall be responsible for replacing all cables that do not pass Category 6 requirements for data and 5e for the voice applications.

G. Maximum horizontal cable length shall be 90 meters.

H. Cable shall have no physical defects such as cuts, tears or bulges in the outer jacket. Cables with defects shall be replaced.

I. Install cable in neat and workmanlike manner. Neatly bundle and tie all cable in closets. Leave sufficient cable for 90° sweeps at all vertical drops.

J. Do not install Category 6 cable with more than 110N (25 lbs) pull force, as specified in ANSI/TIA/EIA and BICSI TDDM practices. Utilize appropriate cable lubricant in sufficient quantity to reduce pulling friction to acceptable levels on long pulls inside conduit, pulls of multiple cables into a single small bore conduit, on conduit runs greater than 100 lineal feet with bends of opposing directions, and in conduit runs that exceed 180 degrees of accumulated bends. Use of tensile rated cords (i.e. fishing line) should be used for difficult or questionable pulls - to judge to go/no-go condition of the conduit and pulling setup.

K. Cables jackets that are chaffed or burned exposing internal conductor insulation or have any bare copper (“shiners”) shall be replaced.

L. Test, label and document as called for in contract documents.

M. Firestop all openings where cable is installed through a fire barrier.

3.4 HORIZONTAL CROSS CONNECT INSTALLATION:

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or

block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained as close as possible to the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.5 OPTICAL FIBER TERMINATION HARDWARE:

A. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

D. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

E. A maximum of 12 strands of fiber shall be spliced in each tray

F. All spare strands shall be installed into spare splice trays.

3.6 BACKBONE CABLE INSTALLATION:

A. Raceways:
1. All backbone cables shall be installed inside innerducts (see specification above) within conduits meeting specification requirements unless specifically noted otherwise.
2. Backbone cables shall be installed separately (in separate innerducts/conduits) from horizontal distribution cables.
3. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
4. Where backbone cables and distribution cables are specifically specified to be installed in a cable tray or wireway, backbone cables shall be installed first, within innerducts meeting specifications above, bundled separately from the horizontal distribution cables.

B. Support:
1. Within Telecommunications Rooms or at Telecommunications Backboards, all backbone cables shall be securely fastened to the backboards on the walls.
2. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
3. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
4. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

3.7 COPPER TERMINATION HARDWARE:

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-A/B standard, manufacturer's recommendations and best industry practice.

B. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.8 RACKS:

A. Floor-mount racks shall be used unless specifically shown otherwise.

B. Floor-mount racks shall be securely attached to the concrete floor using a minimum 3/8” hardware or as required by local codes.

C. Racks shall be placed with a minimum of 36 inches clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

D. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 3.11 of this document.

E. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

F. Wall mounted termination block fields shall be mounted on 4’ x 8’ x .75” void free plywood. The plywood shall be mounted vertically 12” above the finished floor. The plywood shall be painted with two coats of grey fire retardant paint.

G. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18” from the finished floor.

H. Rack-mounted patch panels (and the associated horizontal cable management sections) furnished within the contract shall occupy no more than 40% of the available space within the associated racks (also furnished within the contract) unless specifically shown or specified otherwise. A minimum of 60% of available rack space shall be reserved for owner-furnished equipment. Where the number of patch panels and horizontal cable management sections would exceed 40% of the available rack space, an additional rack shall be installed.

3.9 EQUIPMENT TRAY FOR TELECOMMUNICATION ROOMS:

A. All equipment trays shall be 18” in width.

B. Furnish and install 18" equipment tray from each floor mount rack/server cabinet to wall. Furnish 18" equipment tray around wall as required to support cables. A minimum of two (2) walls shall be completely covered by equipment tray.

C. Furnish and install cable retaining posts on each side of tray every 4 feet as required to supports cables.

3.10 FIRESTOP SYSTEM:

A. All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

3.11 GROUNDING SYSTEM:

A. The TMGB in the MDF shall be connected to the building electrical entrance grounding facility with a #6 AWG ground. Each TBB in each IDF shall be connected to a ground bus in the MDF with #4/0 AWG minimum ground. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

B. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TR or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.

C. The TBB shall adhere to the recommendations of the ANSI/TIA/EIA-607 standard, and shall be installed in accordance with best industry practice.

D. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by the electrical contractor.

3.12 IDENTIFICATION AND LABELING:

A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful structured cabling contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Labeling shall follow the guidelines of ANSI/TIA/EIA-606-A.

B. All label printing will be machine generated by Panduit software (or other) using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

3.13 TESTING AND ACCEPTANCE:

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Panduit Certification Program Information Manual and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Channel Testing
1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance, respectively.
2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-B.1 Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
4. Category 6 Performance:
   a. Follow the Standards requirements established in:
      1) ANSI/TIA/EIA-568-B .1, B.2 and B.2-1
   b. A Level III test unit is required to verify category 6 performance.The basic tests required are:
      1) Wire Map
      2) Length
      3) Attenuation
      4) NEXT (Near end crosstalk)
      5) Return Loss
      6) ELFEXT Loss
      7) Propagation Delay
      8) Delay skew
      9) PSNEXT (Power sum near-end crosstalk loss)
      10) PSELFEXT (Power sum equal level far-end crosstalk loss)

C. Fiber Testing
1. All fiber testing shall be performed on all fibers in the completed end to end system. There shall be no splices unless clearly defined in an RFP. Testing shall consist of an end to end power meter test performed per EIA/TIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550

nanometers for single mode fibers. These tests also include continuity checking of each fiber.

2. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for singlemode) in both directions.
3. Test set-up and performance shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, Method B.
4. Where links are combined to complete a circuit between devices, the structured cabling contractor shall test each link from end to end to ensure the performance of the system. ONLY LINK TEST IS REQUIRED. The structured cabling contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.
5. Attenuation testing shall be performed with an approved hand held tester from an industry recognized test equipment manufacturer.

3.14 SYSTEM DOCUMENTATION:

A. Upon completion of the installation, the structured cabling contractor shall provide three (3) full documentation sets to the owners for approval. Documentation shall include the items detailed in the sub-sections below.

B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the structured cabling contractor shall provide copies of the original test results.

C. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the structured cabling contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.15 TEST RESULTS:

A. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

B. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-A/B including applicable TSB’s and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.

C. Test results generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The structured cabling contractor must furnish this information in electronic form (CD-ROM).

D. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

3.16 AS-BUILT DRAWINGS:

A. The drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD rel. 2002) formats on which as-built construction information can be added. These documents will be modified accordingly by the structured cabling contractor to denote as-built information as defined above and returned to the Owner.

B. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD DWG) form.

3.17 WARRANTY:

A. The manufacturer shall provide a 25 year extended product warranty with a 25 year applications assurance warranty. Manufacturer shall provide the warranty directly to the end user.

B. An Extended Product Warranty shall be provided which warrants functionality of all components used in the system for 25 years from the date of registration. The Extended Product Warranty shall warrant the installed horizontal copper and the backbone optical fiber portions of the cabling system.

C. The Application Assurance Warranty shall cover the failure of the wiring system to support current or future applications that are designed for the link/channel specifications of ANSI/TIA/EIA–568-B.1. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, and 155 Mb/s ATM.

D. The contractor shall provide a warranty on the physical installation.

3.18 FINAL ACCEPTANCE & SYSTEM CERTIFICATION:

A. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a numbered certificate, from the manufacturer, registering the installation.

END OF SECTION 27 10 00

SECTION 28 31 00

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install a complete low voltage, automatic and manual fire alarm system as specified herein and indicated on the drawings.

B. The system shall include a central control panel, power supply, signal initiating devices, audible and visual alarm devices, a conduit and wiring system and all necessary accessories required to provide a complete operating system.

C. The system shall be completely addressable.

D. The system shall comply with the applicable provisions of the National Fire Protection Association Standard Number 72 (National Fire Alarm Code) for fire alarm systems; N.E.C. Article 760; and meet all requirements of the local authorities having jurisdiction.

E. The system shall be provided by a local service organization located within 50 miles of the job site.

1.2 DESCRIPTION OF SYSTEM

A. Conduit, outlet boxes, cabinets, devices and wiring installation for complete fire detection and alarm system.

B. Each and every item of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriter's Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL category UOBZ as a single control unit. Partial listing shall not be acceptable. System controls shall be UL listed for Power Limited Applications per N.E.C. Article 760. All circuits shall be marked in accordance with N.E.C. 760-23.

C. Wiring shown is diagrammatic to define system and is not intended to show every wire. Review drawings prior to bidding and inform Contractor of any additional wiring necessary for installation of systems. Wiring shall comply with pathway survivability requirements defined in NFPA 72. Include cost of all wiring in bid.

D. After completion of work, submit one set of record mylar sepias with items for Owner described above. Typical type drawings will not be accepted.

E. Manufacturer's trained technical representative shall supervise installation, connections and tests. The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring. Before acceptance, manufacturer's representative will test and certify in writing that system is installed and functioning properly as intended by drawings and specifications. Test includes operation of all devices in entire system.

F. Guarantee entire system in writing for one year from date of acceptance by Owner. Guarantee

will cover completely all components, equipment, wiring, etc. Repair any defects found in the system within the guarantee period without cost to owner.

G. Submit with bid a guaranteed price for complete maintenance and service of system for one year beginning at expiration of guarantee period. Price shall be guaranteed for acceptance by Owner until date of substantial completion of system.

1.3 SUBMITTALS

A. Submit complete shop drawings of system for review per minimum requirements of NFPA 72 and local AHJ including the following:

B. Product data cutsheets for all propose equipment with complete descriptive information on each item of equipment including UL listing for all system components

C. Fire alarm NICET designer information and fire alarm contractor permit information

D. Legend, notes, sheet index, wiring schedule

E. To-scale floor plans showing all devices and room names

F. Terminal-to-terminal connection diagrams for system components and associated equipment interfaces. Identify color code and terminal numbers on shop drawings.

G. System input/output matrix

H. Unique device identification numbers

I. Conduit diagrams

J. Battery calculations and voltage drop calculations

K. Typical device installation details

L. Any other information required by Architect to describe system.

1.4 SYSTEM OPERATION

A. Actuation of any alarm initiating device shall cause all audible alarm signals to sound, all visual indicating appliances to flash, activate an alarm LED and local tone-alert at control panel/annunciator, cause an LCD read-out of point in alarm including type of alarm (smoke detector, manual station, etc.), provide a signal to the mechanical controls to shut down or re-route air handling systems according to established plans. This shall include a suitable addressable relay at each air handling unit to shut down all air handlers in a given zone when system goes into alarm.

B. The general alarm devices may be silenced by authorized personnel only, by entering a locked cabinet and operating the proper silencing switch. A subsequent zone alarm shall reactivate the signals. Operation of the silencing switch shall be indicated by a trouble light and audible signal.

C. Operation of any sprinkler monitoring switch, power failure, opens, grounds, or any

disarrangement of the system wiring or components shall be indicated by a visual and audible trouble signal. The audible trouble signal may be silenced; however, the trouble LED shall remain lit until the system has been returned to normal operating condition.

D. Analog Smoke Sensor Operation
1. The smoke sensor shall be a smoke density measuring device having no self contained alarm set-point. The alarm decision for each sensor shall be determined by the control panel. The control panel shall determine the condition of each sensor by comparing the sensor value to stored values.
2. The control panel shall maintain a moving average of the sensors smoke chamber value. Systems that do not automatically maintain a constant smoke obscuration sensitivity for each sensor by compensating for environmental factors and are deemed unacceptable.
3. The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value, a "Dirty Sensor" trouble condition shall be audibly and visually indicated at the control panel for the individual sensor. Additionally, the LED on the sensor base shall glow steady giving a visible indication at the sensor location.
4. If a "Dirty Sensor" is left unattended, and its average value increases to a second predetermined value, an "Excessively Dirty Sensor" trouble condition shall be indicated at the control panel for the individual sensor.
5. The control panel shall automatically perform a daily self-test on each sensor. Checking the electronics in the sensor's base ensures the accuracy of the values being transmitted to the control panel. A sensor which fails the self-test will cause a "Self Test Abnormal" trouble condition at the control panel. A sensor self-test which must be manually initiated by the operator shall not be acceptable.

1.5 SYSTEM FEATURES

A. The fire alarm system shall include the following features as a minimum:
1. Supervision of all field wiring.
2. Microprocessor based solid state modular construction.
3. Ground fault detection and ground fault isolating & supervising circuitry.
4. 80 character LCD display to indicate alarms, supervisory service conditions and troubles.
5. Simultaneous test of all LED's and LCD's from a central point.
6. "Dead Front" design control panel/annunciator with field programmable LED alarm, status and trouble indicators, and all control switches located behind a locked tempered glass door.
7. Fully automatic battery charger and lead alkaline batteries. Batteries shall have capacity to maintain system operation for 24 hours in normal supervisory mode and shall have sufficient capacity remaining to operate in alarm mode for 15 minutes at conclusion of supervisory period. Batteries shall be supervised for connection to the system and for low voltage threshold. Ammeter and voltmeter shall be provided to indicate battery voltage and charging current.
8. Two (2) sets of 2 amp form C auxiliary alarm contacts fused with feedback.
9. One (1) set of 2 amp form C auxiliary trouble contacts.
10. Standard with 99 addressable points (expandable to 250 points) and four input/output (I/0) circuits (expandable to 20 circuits).
11. Basic four (4) amp power supply (expandable as required).
12. 600 event historical logging.
13. System shall be field programmable for offsite monitoring by remote station reverse polarity, local energy master box or shunt master box types.

14. System shall be field programmable for signal circuit type of operation; march time code, temporal code, selective code, zone code, general alarm, time limit cutout and alarm silence inhibit.
15. System shall be field programmable for waterflow/sprinkler supervisory operation on distinct zones as required.
16. Transient suppression protection shall be provided on the system power supply and on the municipal protection circuit to comply with UL 864 requirements. Additionally, surge suppression shall be provided within the control panel on all circuits that extend outside the building (including to roof-mounted HVAC units).
17. Supervised remote annunciator connection circuit.
18. System shall incorporate an alarm/trouble walk test.
19. Resident non-volatile programmable operating system memory for all operating requirements.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANELS/ANNUNCIATORS

A. Furnish and install Simplex type 4010-9101 fire alarm control panel(s) with options and accessories as required.

2.2 MANUAL ALARM STATIONS

A. Manual alarm stations shall be Simplex addressable type 4099-9002 break glass (double-action). The station body shall be so constructed that chips and scratches will not expose metal. All stations shall be master keyed with the control equipment. When actuated, the "Pull Lever" shall remain at right angle to the station body until reset.

B. Boxes:
1. Recessed, two-gang outlet boxes with Simplex type 2099-9813 red, semi-flush trim plates shall be used where possible.
2. Where surface-mount outlet boxes are required, boxes shall be red, cast aluminum Simplex type 2975-9022.

2.3 PHOTOELECTRIC SMOKE SENSOR

A. The smoke sensors shall be of the photoelectric addressable Simplex type 4098-9714 and shall communicate actual smoke chamber values to the system control panel. The smoke sensors shall operate on the light scatter principle. For maximum maintenance free service and low power requirement, light source for detection chamber and visual alarm indication shall be solid state photodiode.

B. Each sensor base shall be visually and electrically supervised.

C. The sensors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which they are connected. The sensors shall be listed for both ceiling and wall mount applications.

D. Each sensor base shall contain integral addressable electronics and an LED that will flash each time it is scanned by the control panel (once every 4 seconds). The control panel shall be responsible for drift compensation. When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to

turn on steady indicating the abnormal condition. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable. Sensor bases shall be compatible with detachable photoelectric, ionization and heat sensors so that these various sensor types can be easily interchanged to meet specific location requirements. Sensor base shall be addressable type as required.

E. Where required, sensor bases shall be provided with a relay driver output and supervised relay, which are to be controlled either automatically or manually from the control panel.

F. Each sensor base shall be scanned by the control panel for its type identification to prevent inadvertent substitution of the wrong sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.

G. Each sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.

H. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.

I. Cover all smoke detection devices with plastic bags immediately after installation to maintain cleanliness, if field conditions so require.

J. Provide a U.L. listed sensor guard for sensors in areas subject to tampering. The guard shall be suitable for ceiling or sidewall mounting and hinged for easy access. The guard shall be securely mounted with tamper-proof screws.

2.4 PHOTOELECTRIC DUCT DETECTOR

A. The detector shall be an addressable, non-polarized 24VDC, Simplex type 4098-9755, which is compatible with the Fire Alarm Control Panel and obtains its operating power from the supervisory current in the fire alarm detection loop. It shall be of the same analog type as the ceiling smoke detectors. Detectors shall be of the solid state photoelectric type and shall operate on the light scattering, photodiode principle. To minimize nuisance alarms, detectors shall have an insect screen and be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive material shall be used.

B. The detector head shall be directly interchangeable with an ionization detector type. The 24VDC detector may be reset by actuating the control panel reset switch.

C. Detector construction shall have a mounting base with a twist-lock detecting head that is lockable. The locking feature must be field removable when not required. Contract between the base and head shall be of the bifurcated type utilizing spring type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel.

D. Sampling tubes sized to match duct size as recommended by equipment manufacturer shall be provided with duct detectors as required.

E. Detector design shall provide compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.). It shall be possible to alarm the duct housing by using a test switch. For maintenance purposes, it shall be possible to clean the duct housing

sampling tubes by accessing them through the duct housings front cover.

F. To minimize false alarms, voltage and RF transient suppression techniques shall be employed as-well-as smoke signal verification circuit and an insect screen.

G. Separate auxiliary SPDT relays for fan shutdown shall be provided with each duct detector for fan shutdown, smoke evacuation or other purposes as indicated on plans.

H. Remote key operated test stations with LED alarm indicators shall be installed in an accessible, inconspicuous location for each duct detector.

I. Duct detectors shall be installed for the equipment as indicated on plans as follows (locations shown on plans are diagrammatical only):
1. A minimum of six duct widths downstream from bends or inlets to avoid air turbulence.
2. On the downstream side of filters to detect fires in the filters.
3. In return ducts, ahead of mixing areas.
4. Upstream of air humidifier and cooling coil.
5. With accessibility for test and service.

J. The following duct detector locations shall be avoided:
1. Where dampers closed for comfort control would interfere with airflow.
2. Next to outside air inlets (unless the intent is to monitor smoke entry from that area).
3. In return air damper branch ducts and mixing areas where airflow may be restricted.

K. Where duct detectors are installed in exterior or wet locations, weatherproof duct housing enclosures shall be provided to protect the detectors. Enclosures shall be located to be in shaded areas rather than direct sunlight. Entire installation shall be as directed by the equipment manufacturer.

2.5 HEAT SENSORS

A. Heat sensors shall be U.L. listed, addressable Simplex type 4098-9733. They shall provide rate-of-rise temperature sensing, fixed temperature sensing (135 degrees F) and utility temperature sensing (32 degrees F to 155 degrees F range).

B. Each sensor base shall be visually and electrically supervised.

C. The sensors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which they are connected. The sensors shall be listed for both ceiling and wall mount applications.

D. Each sensor base shall contain integral addressable electronics and an LED that will flash each time it is scanned by the control panel (once every 4 seconds). The control panel shall be responsible for drift compensation. When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable. Sensor bases shall be compatible with detachable photoelectric, ionization and heat sensors so that these various sensor types can be easily interchanged to meet specific location requirements. Sensor base shall be addressable type as required.

E. Where required, sensor bases shall be provided with a relay driver output and supervised relay, which are to be controlled either automatically or manually from the control panel.

F. Each sensor base shall be scanned by the control panel for its type identification to prevent inadvertent substitution of the wrong sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.

G. Each sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.

H. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.

I. Heat sensor shall be automatically restorable.

2.6 MAGNETIC DOOR HOLDERS

A. Provide Simplex type 2088 series magnetic door holders as required where shown on plans.

2.7 ALARM SIGNALS (AUDIBLE)

A. Horns:
1. Alarm horns shall be Simplex type 4901-9820. The horns shall be polarized and shall be operated by 24 VDC. Each horn assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors shall NOT be accepted. Where horns are shown as a combination audio-visual assembly, they shall be mounted as a combination unit in a single back box (4903 series) . Horns shall be capable of producing 95 dB.

B. Electronic Chimes:
1. Electronic chimes shall be Simplex type 2902 series. The chime shall be polarized and shall be operated by 24 VDC with a minimum of 82 dB at 10 ft. Adaptors shall allow surface, semi-flush, weather resistance, or audio/visual mounting as shown on the plans.
2. Chimes shall have field adjustable volume control. They shall be provided with four (4) connections to insure properly supervised in/out system connection. Chime shall be U.L. listed for its intended purpose. Where chimes are shown as a combination audible-visual assembly, they shall be mounted as a combination unit with an adapter in a single back box.

C. Devices required to be surface mounted shall be furnished with Simplex type 2975-9145 surface mounting box and 4905-9903 adaptor plate.

D. Devices installed in areas subject to mechanical damage (ie. gymnasiums) shall be furnished with suitable wire guards as indicated on plans.

2.8 ALARM SIGNALS (VISUALS)

A. Visual Flashing Lamps (Xenon Strobe):
1. Furnish and install per plans and specs Simplex type 4904 series visible appliance for fire alarm system notification. The appliance shall be 1HZ synchronized (15cd, 30cd, 110cd) with polar distribution or 75 cd illumination as required by the Americans with Disabilities Act (ADA). The appliance shall be U.L. listed to Standard 1971 and have a circumpolar light output allowing mounting in either vertical or horizontal positions or on the ceiling.

2. The light unit shall be of ABS polycarbonate and the lens of high grade, optical quality LEXAN. For optimized light distribution, the xenon flash tube shall be installed perpendicular to the appliance's back plane. A special compound reflector shall be utilized to maximize and best distribute the light pattern in key axis directions.
3. The effect of the illuminated visible appliance shall be observable in a circumpolar pattern. The visible appliance shall be labeled with the word "FIRE" in a contrasting color and the height of each character shall be a minimum of 5/8 inches. In its quiescent state, the word "FIRE" shall be visible.
4. Mounting heights of visual appliances shall in all respects comply with the Americans with Disabilities Act.
5. Visual indicating appliances shall be Simplex type 4904 series and comprised of a Xenon flashtube and be entirely solid state. These devices shall be U.L. listed and be capable of either ceiling or wall mounting. The LEXAN lens shall be pyramidal in shape to allow better visibility. Visual units shall be of the stand alone type.

2.9 REMOTE ANNUNCIATOR

A. Where shown on the plans, provide and install an LCD annunciator. The annunciator(s) shall have a stainless steel finish and shall provide the same functionality as the main control panel front panel display. The annunciator shall communicate to the control panel over one twisted shielded pair of wire and operating power shall be 24VDC and be fused at the control panel. Point-wired annunciators will not be considered as equal.

B. The serial annunciator shall provide a common alarm and trouble circuit consisting of:
1. Control push-button switches – for alarm silence, trouble silence, system reset and manual evacuation duplicating the control panel switches. A key "enable" switch shall be provided to activate or deactivate the control switches.
2. Tone Alert – Duplicates the control panel tone alert during alarm and trouble conditions.
3. System trouble LED.
4. Power on LED.

C. To accommodate and facilitate job site changes the control switches shall have the capability to be programmed on site to provide for manual switch input operation other than their standard purpose.

2.10 SPRINKLER FLOW SWITCHES

A. Sprinkler flow switches and supervisory switches are provided under another section of these specifications. This contractor shall be responsible for electrical connection of these devices to the fire alarm system.

2.11 SMOKE DAMPERS

A. Smoke dampers are provided under another section. This contractor shall be responsible for supplying a source of power and connecting them to the fire alarm system to close on alarm.

2.12 SYSTEM RECORD DOCUMENT CABINET

A. Furnish and install a documentation cabinet at the system control unit or other approved location. All final record documentation shall be stored in the cabinet. Cabinet shall be labeled as "SYSTEM RECORD DOCUMENTS". Cabinet shall include a 4 gigabyte digital flash drive interface with USB connector loaded with a digital copy of all system documentation including shop drawings and product data.

2.13 OFF SITE MONITORING

A. Furnish all material and labor to accomplish and coordinate with local company or fire department as necessary for off site monitoring of the Fire Alarm System. Transmission method(s) shall be as required by applicable codes and Authority Having Jurisdiction (AHJ). Off site monitoring shall be in operation prior to final acceptance. Exact type of off site monitoring (basic reporting or advanced reporting as described below) shall be provided by the contractor per the owner's direction.

B. Furnish and install serial digital alarm communicating transmitter (DACT), capable of reporting specific alarm points to the central station. DACT shall be universal in that it can be utilized to either provide basic reporting (alarm, trouble, supervisory conditions) or more advanced reporting (point-to-point reporting of specific alarm conditions) DACT shall be mounted integral to or beside fire alarm control panel.

2.14 FIRE ALARM CABLING

1. All fire alarm cabling shall:
   a. Have red outer insulation/jacket with ripcord.
   b. Be listed and labeled for the intended use in Fire Alarm systems.
   c. Where Level 2 or Level 3 pathway survivability is required by NFPA 72, cabling shall be 2-hour fire rated circuit integrity (CI) type.
   d. Be manufactured by West Penn, Allied, Belden or Superior Essex.

2.15 FIRE ALARM SYSTEM MANUFACTURER

A. All equipment shall be listed by UL. All panels and peripheral devices shall be the standard equipment of a single manufacturer and shall display the manufacturer's name on each component. Manufacturer's numbers specified in this section are those of Simplex Time Recorder Company to denote type, quality, material and desired operating features to be furnished.

B. Equipment shall be as manufactured by Simplex, Notifier or EST.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations.

B. The contractor shall provide 120VAC power to all remote booster power supplies, control panels, transponder cabinets or other similar items as required. Where the project is provided with emergency power from an emergency generator, all power supplies shall be connected to an emergency source. Dedicated branch circuit(s) shall be provided to supply primary power to the fire alarm system. The associated branch circuit breakers shall be furnished with lock-on hardware and shall be identified with red marking as a fire alarm circuit. The location of the circuit disconnecting means shall be permanently identified at the fire alarm control unit.

C. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 Parts I and III, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 Parts I and II.

D. All wiring shall be installed in strict compliance with pathway survivability requirements of applicable codes including NFPA 72.

E. Upon completion, the contractor shall so certify in writing to the owner and general contractor.

F. Front surface of all junction box covers in concealed areas (such as above lay-in ceilings) or within mechanical/electrical rooms (and other similar areas where appearance of boxes is not an issue) shall be sprayed red and labeled "Fire Alarm" or “F/A”. Covers in exposed areas shall be labeled “F/A” on interior of front cover. Wiring color code shall be maintained throughout the installation.

G. All fire alarm wiring shall be installed in conduit. Conduit shall be sized per manufacturer’s recommendations, but in no case shall conduit be smaller than 3/4”.

H. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.

I. All raceways shall be concealed unless specifically shown or approved otherwise.

J. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.

K. Install System Record Document cabinet adjacent to control panel unless alternate location is approved.

L. The manufacturer's authorized representative shall provide on-site supervision of installation and shall provide all system setup and programming services.

M. The manufacturer’s authorized representative shall have as a minimum, a NICET LEVEL III certification. The fire alarm contractor shall have a technician with a minimum Nicet Level III certification working in a position of responsibility. All technicians working for the certified contractor shall have a minimum Nicet Level II certification. Any fire alarm contractor wishing to bid on the fire alarm work shall show evidence of certifications at the pre-bid conference.

N. The fire alarm contractor shall be licensed as a certified fire alarm contractor by the state in which the work is to be performed in compliance with all requirements of state fire marshall or other AHJ’s as applicable.

O. The drawing/specifications included herein are to indicate contract intent only. The Fire Alarm contractor shall provide final design documents to include plans specifying exact device types/locations, circuitry, battery calculations, circuit/voltage drop calculations, etc. in accordance with all applicable code requirements. These final design documents shall be prepared under the supervision of an engineer licensed in the state where the work is to be performed, engaged/employed by the Fire Alarm contractor, and must bear the engineer’s licensure seal with signature and date.

3.2 TESTING

A. The completed fire alarm system shall be fully tested in accordance with NFPA-72H by the contractor in the presence of the owner's representative and the Local Fire Marshal. Upon completion of a successful test, the contractor shall so certify in writing to the owner and

general contractor, and shall submit final testing results with O&M documentation..

B. The contractor shall test and demonstrate proper operation of all smoke detection equipment and associated HVAC controls to the satisfaction of the authority-having-jurisdiction and fire marshal.

3.3 WARRANTY

A. The contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

B. The equipment manufacturer shall make available to the owner a maintenance contract proposal to provide a minimum of two (2) inspections and tests per year in compliance with NFPA-72H guidelines.

3.4 CERTIFICATION & ACCEPTANCE

A. A factory trained representative of the manufacturer shall supervise final testing of the system in accordance with N.F.P.A. Standard 72H-1984 in the presence of a representative of the authority having jurisdiction. Manufacturer's representative shall be NICET trained and shall have a level III NICET certificate. 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.

B. 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 the date of acceptance or beneficial occupancy whichever is earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.

C. The equipment manufacturer shall be represented by a local service organization, and the name of this organization shall be furnished to the Architect and Owner. The service organization shall be located within 50 miles of the job site. The service organization shall furnish, gratis to the Owner, a one year maintenance warranty contract, effective from the date of final acceptance.

END OF SECTION 28 31 00

SECTION 28 78 00

EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

PART 1 - GENERAL

1.1 INITIAL RADIO SIGNAL SURVEY (INCLUDE IN BASE BID)

A. Include all costs in base bid for the Fire Alarm Contractor to conduct a radio signal survey immediately after building structure is complete, and prior to ceiling installation to determine signal coverage and strength of the municipality's emergency responder radio (public safety) system inside the project facility.

B. Conduct a survey using a RF Spectrum Analyzer, a calibrated, system-compatible radio or another suitable instrument with traceable certificate of calibration to analyze the RF signal strength. Both inbound and outbound signal strength shall be determined, measured, calculated and documented as required by code and AHJ. Survey shall be performed by FCC GROL certified technicians. Survey shall include measurements at a minimum of 20 readings per floor or 1,600SF if the floor area exceeds 32,000SF and in all critical areas or as otherwise directed by AHJ.

C. Survey report and drawing indicating measurements at each frequency band of interest shall be submitted to the AHJ for review. The report shall clearly indicate all areas that do not meet a minimum of -95dBm nominal uplink or downlink signal at 100% or a Delivered Audio Quality (DAQ) of 3.0.

D. If measured levels determined to be insufficient, a complete Emergency Responder Radio Coverage (ERRC) system shall be provided in accordance with these specifications below. Cost for the system and installation will be paid through allowance.

E. Contractor shall be responsible for scheduling survey so that all of the following is completed prior to the installation of ceilings:
1. Conduct initial survey
2. Submit survey results and report to the AHJ for review and determination of system requirements
3. Provide system design and submit shop drawings to architect and AHJ for review

1.2 SCOPE (SEE ALLOWANCES)

A. The contractor shall design, furnish, install, and warranty a complete Emergency Responder Radio Coverage (ERRC) system. The installed system shall include all hardware, bi-directional amplifiers, band-pass filters, surge suppressors, lightning protection, UPS, transmission lines, power cabling, antennas, and other components necessary for a complete operational system as specified and as acceptable to the local authorities having jurisdiction.

B. Equipment manufacturer name and model numbers specified are provided to establish quality of equipment and system operational features. Any proposed substitution of equipment from that specified must be approved by the Architect within ten (10) days prior to bid date.

C. The entire system shall be guaranteed for a period of one (1) year from the date of final acceptance of the installation and the Contractor shall repair or replace defective equipment,

during this period, at no cost to the owner.

D. Entire system shall be verified and approved by local AHJ to comply with all emergency responder radio network requirements including signal strength and frequency range.

1.3 DEFINITIONS

A. BDA: Bi-Directional Amplifier is a two-way signal booster that is used to amplify band-selective or multi-band RF signals in the uplink, to the base station and in the downlink from the base station to subscriber devices for enhanced signals and improved coverage.

B. DAS: Distributed Antenna System is a network of separate antenna nodes connected to a common transport medium.

C. ERRC: Emergency Responder Radio Coverage System is a complete in-building radio communication system that brings wireless signals into a structure from outside, amplifies those signals with a signal booster (BDA), and then evenly distributes the amplified signals throughout a structure via a Distributed Antenna System (DAS). The system also amplifies signals originating inside the building and transmits them outside.

D. Donor Antenna: Antenna that receives and transmits signal to radio system outside of facility.

1.4 STANDARDS

A. The system shall comply with all requirements of the latest edition of each of the following codes and standards. The latest edition of these codes and standards form a part of this specification:
1. U.L. Standard 2524.
2. International Fire Code Section 510
3. NFPA 1225
4. NFPA 72
5. All requirements of local Fire Department, Building Department and all other authorities having jurisdiction (AHJ)

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For headend and distribution system. Include plans, elevations, sections, details and attachments to other work.
1. Show fabrication and installation details for equipment.
2. Functional Block Diagram: Show single-line interconnections between components for headend and distribution system. Show cable types and sizes.
3. Dimensioned Plan and Elevations of Headend Equipment: Show access and workspace requirements.
4. Wiring Diagrams: For power, signal, and control wiring and transmission cable, include cross connects, taps, and other connections cords.

C. Design Calculations: Calculate signal attenuation budget and show calculated line and equipment losses for the system based on the functional block diagram, to show that proposed system layout can be expected to perform up to specification. Calculate signal strength from sources to endpoints. Allowable losses between components and user interface shall be used to

determine size and type of cable.

D. Coordination Drawings: Include dimensioned plan and elevation views of components and enclosures. Show access and workspace requirements.

E. Equipment List: Include each piece of equipment and include model number, manufacturer, serial number, location, and date of original installation. Insert testing record of each piece of adjustable equipment, listing name of person testing, date of test, and description of as-left set points.

F. Field quality-control reports.

G. Operation and Maintenance Data: For headend and distribution system to include in emergency, operation, and maintenance manuals.

H. Contract shall submit set of all drawings and product data to permitting agencies as required. These final design documents shall be prepared under the supervision of an engineer licensed in the state where the work is to be performed, engaged/employed by the system vendor, and must bear the engineer's licensure seal with signature and date.

I. Any permits necessary for the installation of the work shall be obtained prior to the commencement of the work. All permit costs and inspection fees shall be included.

J.

PART 2 - PRODUCTS

2.1 RADIO FREQUENCY (RF) BDA-BASED SIGNAL BOOSTER SYSTEMS

A. In-building signal booster systems shall receive and re-transmit the entire uplink/downlink frequency band utilized by the regional emergency service provider(s)**.** The contractor shall confirm with the regional emergency service provider(s) as to the specific frequencies used by the various agencies. This system shall be state-of-the-art, operating bi-directionally and in full duplex. The system shall be fully compatible with and function on Locality's Public Safety Radio System.

B. BDA shall be capable of providing in building coverage for all the cellular networks as identified by the owner.

C. Signal boosters (BDA)
1. Shall have NEMA Type 4 enclosure
2. Shall be UL2524 listed
3. Shall be FCC certification.
4. Provide standby battery system capable of maintaining the system operational for a minimum of 12 hours or 2 hours if supplied by emergency generator circuit. Batteries system shall be completely enclosed in NEMA Type 4 enclosure.
5. Signal Boosters shall have oscillation suppression circuitry to protect the public safety radio system in case of system malfunction or other causes. The oscillation suppression circuit shall not disable the system operation. Systems that automatically disable the signal booster upon oscillation detection shall not be allowed

6. Signal Boosters shall have uplink noise suppression function to eliminate uplink noise while in standby (i.e. no radio transmission from within a building).
7. Include relays as required for monitoring system with fire alarm system.

D. DAS Antennas shall be architectural, dome or flush type where located in public areas. Stick type antennas are acceptable where located in back-of-house spaces. Finish shall be white unless directed otherwise by architect in submittal review.

E. A dedicated annunciator panel shall be provided next to the fire alarm panel / annunciator or other location as designated by AHJ to annunciate the status of all signal booster locations. The annunciator panel shall provide visual and labeled indication of the following for each signal booster:
1. Normal AC power
2. Loss of normal AC power
3. Battery charger failure
4. Low-battery capacity (i.e., to 70 percent depletion)
5. Signal source malfunction
6. Active RF-emitting device malfunction
7. Active system component malfunction

F. The communications link between the dedicated annunciator and the Emergency Responder Radio Coverage (ERRC) system shall be monitored for integrity.

G. Completed installations (including cabling) shall comply with all applicable codes and standards, including County Building and Electrical Codes, NFPA, ANSI, NEC, OSHA, EIA, IEEE, R-56, etc., as well as the FCC Rules and Regulations, as applicable. Equipment provided shall be UL listed and FCC type accepted for this specific application. Compliance to codes and standards shall extend to include proper grounding, bonding and surge.

H. All cabling shall be plenum rated.

2.2 DESIGN REQUIREMENTS:

A. The system shall provide digital signal strength coverage over 95% area on each floor/level of the equipped building, or in specific areas defined by Locality in a Scope of Work document for a particular building or site. Critical areas shall have 99% floor area coverage.

B. Systems shall provide a minimum digital and analog overage of Circuit Merit (CM) 3 and Delivered Audio Quality (DAQ) 3.0, with a reliability factor of 95%.

C. Antenna isolation shall be maintained between the donor antenna and all inside antennas (D.A.S.) to a minimum of 20dB under all operating conditions

D. A Coverage Acceptance Test shall be executed prior to final acceptance of an installed system. Coverage acceptance testing shall be based on audio quality performance in evenly spaced test grids in the defined service areas. A minimum of 20 tests will be taken per floor/level. Total number of test grids will be determined by the Owner, based on the size of the space per floor/level.

E. Design and appearance will be of “finished” construction, i.e. shall be concealed and/or unobtrusive in finished areas. DAS antennas shall be located in back-of-house areas where

possible. If required to be located in visible public aeras, antennas shall be architectural, low-profile type and located in corridors where possible. Unless indicated otherwise, wire mold and surface conduit installations will not be acceptable unless approved in writing by the Architect in advance.

2.3 MANUFACTURER

A. Equipment shall be as manufactured by Simplex, Notifier or EST or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wiring shall be in strict accordance with the National Electrical Code and all state and local regulations. Wiring shall be installed in accordance with manufacturer's wiring diagrams and shall test free from ground, opens and short circuits.

B. All connections shall be made under the direct supervision of a qualified technician.

C. Contractor shall provide dedicated power circuits as required for system operation. Where an emergency distribution system is provided, radio coverage system power shall be connected to the emergency branch.

D. All vertical riser cabling shall be installed in conduit within a 2-hour fire rated enclosure.

E. All copper circuits routed between or outside of buildings shall be provided with a surge protection device at each end.

F. Securely mount donor antenna on roof and aim towards direction of public safety city repeater antenna. All mounting and penetrations shall be coordinated with roofing contractor.

G. Contractor shall provide all devices and cabling as required to monitor system with building Fire Alarm System in accordance with NFPA 1225 and all other applicable code requirements. At a minimum the fire alarm system shall monitor the following:
1. Signal source malfunction.
2. Active RF-emitting device failure.
3. Low-battery capacity indication when 70 percent of the 12-hour operating capacity has been depleted.
4. Active system component failure.
5. Loss of normal AC power.
6. Failure of battery charger.
7. The communications link between the fire alarm system and Emergency Responder Radio Coverage (ERRC) system shall be monitored for integrity.

H. Refer to Specification Section 27 05 00 for additional installation requirements.

I. During initial installation, each system shall be optimized to perform in accordance with the specifications set forth in the system design, manufacturer's specifications, and FCC regulations. The contractor shall ensure that uplink and downlink levels are properly set and consistent with design expectations. The contractor shall further ensure that noise and spurious

products are held within limits set forth in the system design, manufacturer's specifications, and FCC regulations. Prior to system acceptance, for each active BDA, booster amplifier, etc., the contractor shall submit a Proof of Performance certification, that lists the design expectations, actual measurements, and if applicable, FCC specifications for the following parameters:

1. Worst case BDA uplink input level, in dBm.
2. Worst case BDA uplink output level, in dBm.
3. BDA downlink input level, in dBm.
4. BDA downlink output level, in dBm.
5. Noise and spurious products, BDA uplink output, in dBc.
6. Noise and spurious products, BDA downlink output, in dBc.

J. The original Proof of Performance report shall be submitted to Owner's project manager, and a copy of the Proof of Performance report shall be affixed to its associated equipment.

3.2 WARRANTY

A. The contractor shall provide a full one-year warranty to cover installation and all equipment, software, and components; the warranty shall commence upon the Owner's final acceptance of the facility. Under warranty coverage, the successful contractor shall provide same business day response time for system malfunctions.

B. The contractor shall perform optimization of each system during the initial warranty period, sixty (60) to ninety (90) days prior to warranty expiration. This optimization task is separate from the initial optimization performed during system installation. The contractor shall include pricing for annual system optimization to be included as part of post-warranty maintenance. Actual scope of work for annual optimization and maintenance will vary on a case-by-case basis, but typically will consist of the following:

1. Optimize the system to perform in accordance with the specifications set forth in the system design, manufacturer's specifications, and FCC regulations.
2. Ensure that uplink and downlink levels are properly set and are consistent with design specifications.
3. Ensure that noise and spurious products are held within limits set forth in the system design, manufacturer's specifications, and FCC regulations.

C. Update the Proof of Performance records for the system, listing the design expectations, actual measurements, and if applicable, FCC specifications for the following parameters:

1. Worst case BDA uplink input level, in dBm.
2. Worst case BDA uplink output level, in dBm.
3. BDA downlink input level, in dBm.
4. BDA downlink output level, in dBm.
5. Noise and spurious products, BDA uplink output, in dBc.
6. Noise and spurious products, BDA downlink output, in dBc.

D. The updated Proof of Performance report shall be submitted to the Owner, and a copy of the updated Proof of Performance report shall be affixed to its associated equipment.

E. Visually inspect outside antenna installation. Correct any issues found with the antenna mounting hardware, grounding system, or outside cabling.

F. Visually inspect inside BDA or booster amplifier equipment installation. Correct any issues found with RF cabling, electrical connection, or equipment mounting.

G. Clean equipment fans, filters and other ventilation system components.

H. Inspect and replace any defective indicator lights.

I. Test battery system performance for proper fallback to battery power and the duration of battery operation.

J. Test fault reporting system for proper operation and reporting of system faults.

K. Submit a written Preventive Maintenance Report to the Owner, listing the results of the optimization and preventive maintenance effort. The report shall include the Proof of Performance report for active RF components, and details of any other discrepancies found and corrective actions taken.

L. All as-built drawings shall be submitted to the Owner at completion, which shall include antenna system layout and all associated hardware, along with specification sheets. Include RF measurements taken.

END OF SECTION 28 78 00



Applicable for Sections: 02 4100, 31 1000, 31 2000, 31 2500, 32 1216, 32 1313, 32 1613, 32 1723, 33 1000, 33 3000 and 33 4001

SECTION 31 1000

SITE CLEARING

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.

B. Related work specified elsewhere includes Sections:
.. Section 31 2000 - “Earth Moving”
.. Section 02 4100 - “Demolition”

1.2 SUMMARY

A. This Section includes the following:

1. Protection of existing trees and landscaping to remain, if any, and boundary and property line markers, bench marks, survey control points, and existing structures and improvements which are to remain.

2. Environmental and erosion control measures, as indicated and as otherwise required by applicable codes, regulations, and authorities having jurisdiction.

3. Removal of trees and other vegetation, as indicated, and within “controlled areas.”

4. Topsoil stripping, and stockpiling, as indicated, and within “controlled areas.”

5. Removing above-grade improvements as indicated, and as required to accommodate new construction.

6. Removing below-grade improvements as indicated, and as required to accommodate new construction.

1.3 PROJECT CONDITIONS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction, unless specifically indicated elsewhere in contract documents.

B. Protection of Existing Improvements:

1. Provide protection necessary to prevent damage to existing improvements indicated to remain in place. Clearing, demolition and any excavation within 5'-0" of existing buildings and structures to remain shall be performed by hand.

2. Protect improvements on adjoining properties and on Owner's property.

3. Protect boundary and property line markers, bench marks, and survey control points.

4. Restore damaged improvements and markers to their original condition, as acceptable to property owners.

PART 2 - PRODUCTS

A. Not applicable to this Section.

PART 3 - EXECUTION

3.1 SITE CLEARING

A. General:

1. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated.

B. Topsoil:

1. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 6 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

2. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

   a. Remove heavy growths of grass from areas before stripping.

3. Stockpile topsoil in storage piles in areas as indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, as required, to prevent wind erosion, or seed and mulch if left undisturbed for a period of time greater than 14 consecutive days.

4. Legally dispose of off-site unsuitable soil, excess topsoil not to be stockpiled, and waste material debris.

5. Fill depressions caused by site clearing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

   a. Place fill material in horizontal layers not exceeding 8 inches loose depth, and thoroughly compact to a density equal to adjacent original ground, unless specific compaction is otherwise indicated in Section 31 2000 "Earth Moving", or, as directed in the geotechnical investigation.

3.2 DISPOSAL OF WASTE MATERIALS

A. Burning on Owner's Property: Burning will not be permitted on Owner's property.

B. Removal from Owner's Property: Remove waste materials, trash and debris, and legally dispose of same off site.

END OF SITE CLEARING

SECTION 31 2000

EARTH MOVING

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.

B. Related work specified elsewhere includes:

.. Section 01 2200 - "Unit Prices"
.. Section 01 7800 - "Closeout Submittals"
.. Section 02 3213 – "Subsurface Investigation"
.. Section 31 1000 - "Site Clearing", "Report of Geotechnical Investigation"
.. Section 32 1313 - "Concrete Paving"
.. Section 03 3100 - "Concrete"
.. Division 26 - "Electrical"

1.2 SUMMARY

A. This Section includes unclassified excavation, grading and fill as follows:

1. Preparing of subgrade for building slabs, walks, and pavements; and additional work indicated on the Drawings and in the Project Manual.

a. Comply with recommendations in the Owner's "Report of Geotechnical Exploration", or if not included, as required by the Bid and Contract Documents, this Section, and other Division 31 Sections; Refer also to Civil and Structural Drawings for additional information and requirements.

b. Undercutting of control areas as indicated in the Report of Geotechnical Investigation, or if not included, as required by the Bid and Contract Documents.

c. Perform excavation by hand within 5'-0" of existing buildings and structures to remain. Design and provide all necessary supports, shoring, etc., as required to prevent settlement, collapse, and/or other damage to existing buildings and structures to remain.

1) DO NOT EXCAVATE BELOW THE EFFECTIVE BEARING AREA OF FOUNDATIONS OF EXISTING BUILDINGS AND STRUCTURES. In the event of conflict during construction, notify Architect prior to proceeding with work in the effected area.

d. Compaction of backfill at any basement and below grade walls shall only be by hand-directed compaction equipment. Heavy construction equipment and/or

heavy trucks shall not be allowed within 10-feet of any basement walls, and within 5-feet of foundation walls.

2. Drainage fill course (porous fill) for support of building slabs is included as part of this work; compacted in place.

3. Excavating and backfilling of trenches within building control areas and on site.

4. Stripping and stockpiling of topsoil (if any) is specified in Section 31 1000 - Site Clearing.

5. The extent of earthwork is indicated on the Drawings. This earthwork is to be included in the base bid as unclassified excavation, regardless of material encountered.

6. Removal of existing improvements may also be specified under various Division 31 Sections.

B. Excavating and Backfilling for Plumbing, HVAC, and Electrical Work: Refer to Divisions 22, 23, and 26 sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances, not work of this Section.

1. However, construction materials and execution for Plumbing, HVAC, and Electrical work shall comply with requirements of this Section, and related Division 31 Sections, when the work and/or materials required are not indicated or only partially indicated in Divisions 22, 23, and 26.

C. Placement and compaction of at least 4-inches of topsoil up to finish grades is included in the work of this Section.

1. Allow for thickness of topsoil and sod.
2. Refer to Division 32 sections for topsoil composition and placement requirements.

1.3 DEFINITIONS

A. “Excavation” consists of removal of materials and existing improvements encountered to subgrade elevations indicated, and subsequent disposal of materials removed.

B. “Unauthorized” excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner’s Geotechnical Engineer. Unauthorized excavation, as well as remedial work directed by Owner’s Geotechnical Engineer, shall be at Contractor’s expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Owner’s Geotechnical Engineer.

2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Owner's Geotechnical Engineer.

C. "Additional Excavation": When excavation has reached required subgrade elevations, notify Owner's Geotechnical Engineer, who will make an inspection of conditions. If Owner's Geotechnical Engineer determines that bearing materials at required subgrade elevations are unsuitable, continued excavation may be required. If additional excavation is required, replace excavated material as directed by Owner's Geotechnical Engineer.

1. The Contract Sum will be adjusted by Change Order, or as provided in General Conditions, for additional excavation, measured in place (Bank Measure), and its replacement appropriately authorized in writing prior to beginning the work, and for which the Contractor is due payment from the Owner.

D. "Subgrade": The undisturbed earth or the compacted soil layer immediately below pavement base course, select drainage fill, bottom of indicated undercut areas, or topsoil materials.

E. "Structure": Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

F. "Building Control Area" and/or "Controlled Area": Below and at least 10-feet beyond building foot print or exterior walls, and below roofs, to include covered porches and canopies, and below and at least 5-feet beyond all walks and pavements subject to bearing vehicular traffic.

G. "Mud Footings" (if any): The at least 2-inches to 4-inches of lean 2,500 psi (minimum) concrete placed in the bottom of footing and foundation trenches and excavations, which is required if permanent or structural concrete cannot be placed the same day they are excavated.

1. Unless mud footings are indicated on Structural Drawings, their depth shall be compensated for by over-excavation.

2. Mud footings (if any) shall be completely clean prior to placement of any reinforcing and/or permanent or structural concrete.

3. Refer to the Structural Drawings for additional information and requirements for other "mud footings" (or "mud mats", or "mud seals").

H. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, short-tip-radius rock bucket; rated at not less than 120-hp (89-kW) flywheel power with bucket-curling force of not less than 25,000 lbf (111 kN) and stick-crowd force of not less than 19,000 lbf; measured according to SAE J-1179.

2. Bulk Excavation: Late-model, track-mounted dozer equipped with a single tooth ripper; rated at not less than 250-hp flywheel power and developing a minimum of 45,000-lbf (200-kN) breakout force; measured according to SAE J-732.

3. Refer to "Owner's Report of Geotechnical Exploration", or if not included, as required by the Bid and Contract Documents for additional information regarding recommendations when rock is encountered.

1.4 SUBMITTALS

A. Test Reports: Submit the following reports directly to Architect, Civil Engineer, Structural Engineer, and the Owner, directly from the testing service, with copy to Contractor:

1. Test reports on fill and borrow material.

2. Verification of suitability of each foundation, floor slab and subgrade condition and material, in accordance with specified requirements.

3. Field reports; and in-place soil density tests.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work on site and in right-of-ways in compliance with applicable requirements of authorities having jurisdiction.

B. Testing and Inspection Service: All required soil testing and inspection services during earthwork operations shall be performed by a qualified independent geotechnical testing laboratory.

1. Refer to Section 01 0150 - "Special Conditions", for additional information and requirements.

1.6 PROJECT CONDITIONS

A. Site Information: Refer to Section 31 1000 - "Site Clearing", and Civil Drawings, for additional information and recommendations.

B. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations in the vicinity, and as may also be required for other construction work.

1. Notify the Alabama Line Location Center at 1-800-292-8525 at least 2-full working days (48 hours), excluding weekends and holidays, prior to any excavation work. This organization will contact its member utility companies to locate and mark all of their own underground facilities.

a. Notify non-member companies directly, for them to perform this service.

2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions and record locations on as-built record drawings. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

3. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.

   a. Provide minimum of 48-hour notice to Owner and copy Architect, and receive written notice to proceed before interrupting any utility.

4. Demolish and completely remove from the site any existing underground utilities to be removed, and all existing underground utilities in "controlled areas". Coordinate with utility companies for shutoff of services if lines are active.

C. Use of Explosives: **Use of explosives *is not* permitted.**

D. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights.

2. Operate warning lights as recommended by authorities having jurisdiction.

3. Comply with requirements of current regulations of OSHA, applicable Codes, ordinances, and authorities having jurisdiction.

4. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

5. Perform excavation by hand within 5'-0" of existing buildings and structures to remain, and within dripline of large trees to remain. Protect root systems from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap. Paint root cuts of 1-inch and larger with emulsified asphalt tree paint.

   a. Do not under-mine or excavate below footings and/or foundations which are to remain.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS - DEFINITIONS

A. Satisfactory soil materials are defined as clean, non-saturated, non-organic sections of earth taken from acceptable sources, and complying with ASTM D2487 soil classification groups included in recommendations of the Owner's "Report of Geotechnical Exploration", or if not included, as directed at the time of earthwork

operations and/or acceptance resulting from acceptable test results obtained on soil materials proposed by the Contractor and tested by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

Liquid Limit (LL)	**Less than 50%**
Plasticity Index (PI)	**Less than 30%**
Maximum Dry Density (ASTM D-698)	**Greater than 100 pcf**
Maximum Particle Size	**3 inches or less**
Organic Matter	**Less than 5%**

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups other than those indicated above.

C. Drainage Fill (or "porous fill" or "drainage aggregate"): Clean, washed, evenly graded mixture of free-draining pea gravel, coarse sand, or crushed stone, with not more than 50 percent passing a No. 50 sieve and not more than 5 percent passing a No. 200 sieve, and subject to approval by the project geotechnical engineer and testing laboratory; **Minimum 4-inches compacted completed thickness.**

D. Backfill and Fill Materials (Grassed areas only; Cuts and fills outside "controlled areas", during general grading): Satisfactory soil materials from on-site excavations, free of clay, rock or gravel larger than 2-inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious material.

1. All fill soils must be compatible with existing soils, so they can bond together.

E. Topsoil: Refer to Section 31 1000 - "Site Clearing."

F. Rock Fill: Refer to Owner's "Report of Geotechnical Investigation", or if not included, as required by the Bid and Contract Documents for recommendations regarding placement and compaction requirements.

PART 3 - EXECUTION

3.1 PROOFROLLING

A. Areas throughout significant slopes and beneath and 10'-0" beyond new building and covered areas, and beneath and 5'-0" beyond new pavement areas (back-of-curb or other paving edge termination) shall be designated as "controlled areas." Prior to placement of fill earth and following removal of cut earth, the controlled areas shall be proofrolled. Areas to be filled shall be proofrolled prior to any fill placement; cut areas shall be proofrolled after they are brought to subgrade level. Proofrolling shall be performed with a loaded tandem axle dump truck or similar approved equipment. The proofroller shall make at least two passes over each section in

perpendicular directions over the "controlled areas". If any areas fail the proofroll, repair these areas as directed by the Owner's Geotechnical Engineer.

1. Proofrolling shall be conducted in the presence of testing lab's Geotechnical Engineer.

2. Do not proofroll when the ground surface is wet or saturated with water.

3.2 EXCAVATION

A. Earth Excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as structures, foundations, rock or unauthorized excavation.

B. Perform excavation by hand within 5'-0" of existing buildings and structures to remain.

1. Do not under-mine or excavate below footings and/or foundations which are to remain.

C. Refer to "Definitions" paragraph above for any "mud footings" required.

3.3 STABILITY OF EXCAVATIONS

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

3.4 DEWATERING

A. Prevent surface water and Geotechnical or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Contractor to provide and maintain, at their expense, pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3. Due to the types of soil that exist on site, seepage and/or springs may occur. If excessive seepage or springs are discovered, notify Owner's Geotechnical Engineer and Architect immediately.

3.5 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill only within the limits of the area under construction. No stockpiling will be allowed in areas that are not under construction. If there is not room for stockpiling, then the contractor will be responsible for legally disposing of the material and will not get additional compensation for the replacement of that material if fill is needed. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations.

2. Dispose of excess excavated soil material by removal and legal disposal off-site.

3.6 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. 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 Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus, a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.

3. Should additional undercut be required per the recommendations of the owner's "Report of Geotechnical Exploration," or as directed by the owner's geotechnical engineer, this material is to be replaced with acceptable structural fill and properly compacted. All excess undercut will be disposed of off-site at the contractor's expense.

3.7 EXCAVATION FOR WALKS AND PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

1. Should additional undercut be required per the recommendations of the owner's "Report of Geotechnical Exploration," or as directed by the owner's geotechnical engineer, this material is to be replaced with acceptable structural fill and properly compacted. All excess undercut will be disposed of off-site at the contractor's expense.

3.8 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6-inches to 9-inches of clearance on both sides of pipe or conduit.

B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on minimum of 4-inches of compacted "select fill" bedding. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

C. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage, etc.) so top of piping is not less than 2'-0" below finished grade and/or paving.

D. Where rock or concrete is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of dense graded crushed stone, prior to installation of pipe.

3.9 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.10 BACKFILL AND FILL

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

1. Under all areas, use satisfactory excavated or borrow material. Refer to Owner's "Report of Geotechnical Exploration", or if not included, this Section, for minimum testing requirements.

2. Under building slabs, use drainage fill material of compacted and finished depth indicated, or if not indicated, **at least 4-inches** compacted and completed thickness.

3. Backfill trenches with concrete where trench excavations pass within 18-inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

   a. Concrete is specified in Division 3.

   b. Do not backfill trenches until inspections and any required testing have been made and backfilling is authorized by Architect based on test results. Use care in backfilling to avoid damage or displacement of pipe systems.

   c. Utility trenches shall be backfilled with acceptable borrow or dense graded aggregate in 6" loose lifts compacted with mechanical piston tampers to the project requirements. Open graded stone is <u>not</u> to be used as backfill.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, etc.

2. Inspections, testing, approval, and recording locations of underground utilities have been performed and recorded.

3. Removal of concrete formwork, if any.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.

   a. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris from excavation.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls, where necessary.

3.11 PLACEMENT AND COMPACTION - GENERAL

A. Ground Surface Preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1-vertical to 4-horizontal so that fill material will bond with existing surface.

2. Prior to placement of fill earth and following removal of cut earth, the controlled areas shall be proofrolled. Areas to be filled shall be proofrolled prior to any fill placement; cut areas shall be proofrolled after they are brought to subgrade level. Proofrolling shall be performed with a loaded tandem axle dump truck or similar approved equipment. The proofroller shall make at least two passes over each section in perpendicular directions over the "controlled areas". If any areas fail the proofroll, repair these areas as directed by the Owner's Geotechnical Engineer.

   a. Proofrolling shall be conducted in the presence of testing lab's Geotechnical Engineer.

   b. Do not proofroll when the ground surface is wet or saturated with water.

B. 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.

C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry

density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. General Fill Embankment Construction

1. Embankment construction shall commence at the toe of the proposed slope and continue upwards as additional fill is placed. The engineered fill placed shall be benched into the natural slopes.

2. The embankment is to be overfilled and then cut back to the required geometry to remove the uncompacted material that is usually present on the face of fill slopes.

3. The face of slopes shall be promptly vegetated according to the Erosion Control Plan, and the CBMPP to prevent erosion after construction. Prior to vegetation, 4” minimum topsoil or as directed by Division 32 sections, is to be placed and tracked in by a dozer moving up and down the slope to create horizontal track lines.

F. Rock Fill:

1. Rock Fill is not to be used unless acceptable to the Owner’s Geotechnical Engineer. Break larger particles down to 3” or less and treat as soil fill.

G. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Owner's Geotechnical Engineer if soil density tests indicate inadequate compaction.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 698 A:

a. Under structures, building foundations and slabs, and 10' beyond those perimeters, compact full depth of fill placement and scarify, moisture condition and re-compact in accordance with the recommendations made in the Owner’s “Report of Geotechnical Exploration”, or if not included, as directed at the time of earthwork operations by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

1) Cut areas shall be proof rolled prior to and during scarification efforts and observed by the Owner’s Geotechnical Engineer.

b. Under steps, covered areas, sidewalks, mechanical/utility and in all "controlled areas", compact in accordance with the recommendations made in the Owner’s “Report of Geotechnical Investigation”, or if not included, as directed at the

time of earthwork operations by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

c. Under pavements and at least 5-feet beyond (measured from back-of-curb or edge of paving, where occurs), remove loose soils as described in this and replace with suitable material that is compacted to 98% standard proctor.

d. Under lawn or unpaved areas beyond "controlled areas", compact each layer of backfill or fill material in accordance with the recommendations made in the Owner's "Report of Geotechnical Investigation", or if not included, as directed at the time of earthwork operations by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

e. On-site Borrow (where allowed): In accordance with the recommendations made in the Owner's "Report of Geotechnical Investigation", or if not included, as directed at the time of earthwork operations by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

f. Select and/or Structural Fill: In accordance with the recommendations made in the Owner's "Report of Geotechnical Investigation", or if not included, as directed at the time of earthwork operations by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

g. Porous Fill (drainage course): In accordance with the recommendations made in the Owner's "Report of Geotechnical Investigation", or if not included, as directed at the time of earthwork operations by the project Geotechnical Engineer, as required by the Bid and Contract Documents.

2. Moisture Control:

a. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

b. Remove and replace, or scarify and moisture condition, soil material that is too wet to permit compaction to specified density.

c. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist moisture conditioning by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

d. At the time of densification, the moisture content of "engineered fill", "structural fill", and "select fill" should be within -3% to +3% of the materials' ASTM D-698 optimum moisture content.

e. Structural fill areas exposed to excessive wetting, drying or otherwise disturbed by the construction following acceptance for moisture and density should be

retested followed by the correction of deficient areas just prior to the installation of additional fill or structures.

f. In no instance should placement of structural fill or ground supported structures be permitted if the ground surface soils contain a moisture content in excess of 2% of the material's optimum moisture content.

g. In no case shall porous drainage backfill (except as specifically indicated at foundation drains only) or masonry sand material be used adjacent to foundations. Care shall be taken to prevent masonry brick/block debris from falling or being pushed into foundation excavations.

3.12 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10-foot above-or-below required subgrade elevations. Refer to Division 32 sections for topsoil requirements.

2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10-foot above-or-below required subgrade elevation.

3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2-inch above or below required subgrade elevation.

4. Connection of Existing and New Work: Provide flush transition, unless specifically indicated otherwise.

C. Grading Surface of Fill under Building Slabs and "Building Control Areas": Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.13 BUILDING SLAB DRAINAGE COURSE

A. General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs, sidewalks, pads, and below canopies and covered porches, and elsewhere as indicated.

1. Minimum Completed Thickness: 4-inches.

B. Placing: Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

1. When a compacted drainage course is indicated to be 6-inches thick or less, place material in a single layer. When indicated to be more than 6-inches thick, place material in equal layers, except no single layer more than 6-inches or less than 3-inches in thickness when compacted.

3.14 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction:

1. Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

2. Perform field density tests in accordance with ASTM D 698 (sand cone method), or acceptable ASTM methods or nuclear testing method, as applicable.

3. New Footing Subgrade: All foundation excavations shall be observed by the Project Geotechnical Engineer or his representative to verify required design bearing capacities of the bearing soils.

4. New Paved Areas, New Building Slab and "Building Control Areas" Subgrade: Perform at least one field density test of subgrade for every 5,000-square feet of fill area for each foot of vertical thickness of fill placed in "controlled areas", with a minimum of one (1) test per lift.

5. Foundation Wall Backfill: Perform at least 2-field density tests at locations and elevations as directed.

6. Trenches: Perform at least one field density test for every 50-linear feet for each 8 inches of vertical thickness of fill placed in utility or similar trenches, which extend through the "controlled areas".

a. Retaining walls, if any, same as for "Trenches", as indicated above.

7. A laboratory soil particle size, Atterberg limit, and Proctor moisture density relationship test shall be performed on each different type of fill soil used in the "controlled areas".

8. Based on the Project Geotechnical Engineer's testing reports, inspections, and recommendations, subgrade or fills that are below specified density, additional earthwork, compaction, and/or other operations, and re-testing, shall be performed until specified density is obtained.

3.15 EROSION CONTROL

A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction.

3.16 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Repair edges of existing pavements, sidewalks, etc., and other existing and/or new improvements flush with and to match existing materials and thicknesses, subject to acceptance by Owner and Architect.

D. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

E. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner’s Property:

1. Remove excess and waste materials, including unacceptable excavated material, trash, debris, and waste materials, and legally dispose of off Owner’s property.

END OF EARTHWORK

SECTION 31 2500

EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Temporary and permanent erosion control systems.

B. Slope Protection Systems.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary and Division 1 Specification Sections, apply to this Section.

1. Section 31 1000 - Site Clearing
2. Section 31 2000 – Earth Moving
3. The Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, March 2022 edition or most recent edition.
4. Erosion and Sediment Control Plan

1.3 ENVIRONMENTAL REQUIREMENTS

A. The Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract.

1. The Contractor shall be responsible for the removal of sediments and debris escaping the project site, the remediation and/or repair of any damage that may occur as a result to adjoining and/or downstream affected properties or offsite structures and any fines or penalties levied against the project by regulatory agencies due to deficiencies of control measures.

B The Contractor will designate, by name, a Qualified Credentialed Professional (QCP) or equivalent person responsible for monitoring of all erosion control measures for this project. Specific responsibilities will include:

1. Assuring and certifying the Contractor's construction sequence is in conformance with the specified schedule. In addition, a weekly certification stating compliance, any deviations, and corrective measures shall be filed with the Owners by this person. A copy of the certification form may be obtained from the Alabama Department of Environmental Management (ADEM) or the consulting Engineer who obtained the permit.

2. Inspection of all erosion control measures and drainage inlets within 24-hours after any significant rainfall. A significant rainfall shall be defined as over 3/4 inch of

precipitation in any consecutive 24 hour period.

3. Inspect areas for catch of grass. A minimum catch of 75 percent is required prior to warrant removal of erosion control measures.

4. Obtain the NPDES permit. All fees associated with the correspondence with ADEM and inspections as part of the maintenance of the permit are the responsibility of the contractor.

C. Other than the land clearing activities required to install the appropriate erosion and sediment control measure in accordance with the erosion and sediment control plans, any down slope erosion and sediment control measures, on-site stream channel protection and upslope diversion of drainage required by site conditions, shall be in place and functional before any clearing or earth moving operations begin and shall be constructed and maintained throughout the construction period.

1. Temporary measures may be removed at the beginning of the workday but shall be replaced at the end of the workday.

D. The angle for graded slopes and fills shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control devices or structures. Any slope or fill which has been graded shall, within thirteen (13) days of the completion of such grading or the completion of any phase of grading, be planted or otherwise be provided with ground cover, materials, devices, or structures sufficient to retain erosion. The devices, structures, and measures shall remain in place until the graded slope or fill is stabilized.

E. All hazardous substances used for this project shall be stored in accordance with current Spill Prevention Control and Countermeasures (SPCC) regulations.

1. Store substances away from storm drains, ditches, and gutters in water-tight containers.

2. Dispose of substances in accordance with ADEM regulations.

3. Provide adequate trash containers on-site for the disposal of material waste.

4. Prevent trash and debris from entering storm drainage system.

F. All construction materials shall be properly stored, not exposed to rain, and stockpiled. All containers shall be stored closed or under cover. All excess or waste material shall be disposed of properly.

1. Provide a construction waste dumpster or trailer on-site for disposal of construction waste.

2. Dispose of trash and waste to an acceptable offsite facility every week at a minimum.

3. Prevent trash and debris from entering storm drainage system.

G. There shall be no distinctly visible floating scum, oil, or other matter contained in the storm water discharge to a receiving water, must not cause an unnatural color (except dyes or other substances discharged for the purpose of environmental studies and which do not have a harmful effect on the receiving water) or odor in the receiving waters. The storm water discharge to receiving water must result in no material in concentration sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving water.

1. Ensure all materials are handled appropriately.

2. No pollutants are allowed to be disposed of on-site or allowed to enter the storm drainage system.

H. Upon completion of the land disturbing activity and stable vegetation or other permanent controls have been established on all remaining exposed soil, the Contractor shall notify the Owner of this and request a final inspection.

1. The Owner, or his authorized agent, will inspect the site within 5 working days after receipt of notice.

I. The Contractor shall prevent the tracking of mud and debris onto paved roadways from construction areas.

1. Provide a construction exit pad in accordance with the erosion and sediment control plans and in accordance with the approved installation procedures, and maintain it on a daily basis.

a. Provide a spray hose for the washing of tires and equipment

b. Rework or supplement the construction exit pad stone as required to ensure its continued effectiveness throughout the duration of the construction period.

2. Remove any sediments tracked offsite or deposited on the adjacent roadways.

a. Utilize a mechanically operated street sweeper to remove any mud and sediment deposited on the adjacent roadways.

J. The Contractor shall be responsible for keeping dust to a minimum through the use of water trucks or other dust controlling methods throughout the construction duration.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Quick growing grasses for temporary seeding (see seed mixes contained in CBMPP and in Plans).

B. Fencing for siltation control as specified on the plans.

C. Temporary mulches such as loose hay, straw, netting, wood cellulose or agricultural silage.

D. Fence stakes shall be metal stakes a minimum of 54 inches in length.

E. Stone check dams shall be spaced according to the Plans.

F. Stone Sediment Barriers or SiltSacks ™, or approved equal for inlet protection.

G. High Density Poly-Ethylene (HDPE) Filters or Silt-Saver™, or approved equal for inlet protection.

H. A stabilized construction entrance shall be constructed temporarily.

I. Riprap for slopes, culvert, storm drain inlet, and outlet aprons.

J. Water for dust control.

K. Wattle check dams shall be spaced according to plans.

L. Erosion control blankets and/or turf reinforcement mats to protect seed and prevent erosion on slopes.

PART 3 – EXECUTION

3.1 PREPARATION

A. Review site erosion and sediment control plan attached to this section of the specifications.

B. Deficiencies or changes in the erosion control plan as it is applied to current conditions will be brought to the attention of the Engineer for remedial action.

3.2 IMPLEMENTATION

A. Provide catalog cuts and information concerning the erosion control products which will be used for construction for review by the Engineer.

B. Provide information concerning the installation of the erosion and sedimentation control including anchorage trench provisions and anchorage devices and spacing for review by the Engineer.

C. Provide construction exit pad in accordance with the erosion and sediment control plan and in accordance with the approved installation procedures.

D. Place erosion control systems in accordance with the erosion and sediment control plan and in accordance with approved installation procedures.

E. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations. The Owner has the authority to direct the Contractor to provide immediate permanent or temporary pollution

control measures. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.

F. The temporary erosion control systems installed by the Contractor shall be maintained as directed by the Engineer to control siltation at all times during the life of the Contract. The Contractor must respond to any maintenance or additional work ordered by the Engineer within a 48 hour period.

G. Slopes that erode easily shall be temporarily seeded as the work progresses according to the ALDOT seeding schedule or according to the seeding schedule contained in the plans.

H. Remove and properly dispose of accumulated silt and sediment from all erosion control measures on a daily basis off site unless material is reusable.

I. Remove and properly dispose of all trash and sediments accumulated in existing and new storm drainage inlets, structures, and pipes on a daily basis off site unless material is reusable.

J. Provide temporary diversion berms and ditches as required during construction to protect work areas from up-slope runoff and/or to divert sediment-laden water to appropriate sediment control devices, traps, or stabilized outlets.

K. Provide water trucks or other adequate method for controlling dust throughout the construction period.

END OF EROSION & SEDIMENTATION CONTROL

SECTION 31 3116
TERMITE CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Site-applied termiticide for wood, steel, and concrete.

1.02 RELATED REQUIREMENTS

A. Section 02 4100 - Demolition.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.

C. Manufacturer's Instructions: Indicate caution requirement.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified, with minimum 3 years of documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Installer Warranty: Provide 2-year warranty for termite control commencing on Date of Substantial Completion. Complete forms in Owner's name and register with installer.

C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Site-Applied Termiticide:
   1. Site-Applied Termiticide for Wood, Steel, and Concrete: Borate mineral salt based, spray-applied termiticide formulated for use on wood, steel, concrete, and other building materials.
      a. Active Ingredient: 40 percent minimum disodium octaborate tetrahydrate (DOT).
      b. Carrier and Penetrant: Proprietary glycol solution.

PART 3 EXECUTION

3.01 APPLICATION

A. Comply with manufacturer's written instructions.

3.02 PROTECTION

A. Do not permit soil grading over treated work.

B. Protect applications from damage after completion. Repair disturbances according to manufacturer's written instructions.

3.03 MAINTENANCE

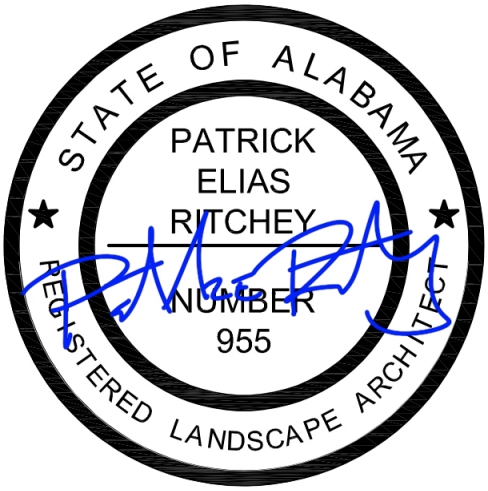
A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Provide separate maintenance contract for service and maintenance of termite control for five years from Date of Substantial Completion.

END OF SECTION

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SECTION 32 0000
SEAL SHEET



4/24/2026

LANDSCAPE ARCHITECTURE SECTIONS:
32 9100 – PLANTING SOILS AND PREPARATION
32 9300 – PLANTS

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SECTION 32 1216

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

B. Related work described elsewhere includes:

.. Section 31 2000 - "Earth Moving"
.. Section 32 1313 - "Concrete Paving"
.. Section 32 1613 - "Curbs and Gutters"

1.2 DESCRIPTION OF WORK

A. Work described in this section includes new bituminous paving, a new base, and otherwise as indicated on drawings.

B. Work shall also include pavement patching for any utility trenches under existing paving and this Contract, with prepared subgrade, 8" crushed aggregate base, 6 inch thick 3,000 psi concrete, prime coat, and 1-1/2 inches bituminous concrete overlay, and as indicated on the Drawings.

1. Pavement patch shall extend 9" to 1'-0" beyond each side or edge of trench, and to abut flush with edge where existing paving was cut out.

1.3 QUALITY CONTROL

A. Certifications: The Contractor shall submit to the Architect copies of certificates from suppliers of bituminous materials and other manufactured items, certifying that these products comply with specifications and standards listed hereinafter.

1. All asphalt used for pavement shall be produced by a plant certified by the Alabama Department of Transportation (ALDOT).

B. Standard Specifications: Unless otherwise noted, all specifications referred to shall be the "Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction", latest edition.

C. Testing: All laboratory and field testing required to ensure compliance with these specifications will be performed by an independent testing laboratory. Refer to Section 01 0150 - "Special Conditions," for additional information.

1.4 JOB CONDITIONS

A. Any base or sub-base areas damaged by weather or construction operations shall be scarified, remixed and recompacted in accordance with requirements before application of the prime coat.

B. Special care and attention shall be given to be certain that paving operations and/or equipment do not cause damage to any existing and/or new buildings, structures, or improvements which are to remain.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide the paving system(s) indicated on the Drawings, installed in accordance with Part 3 of this Section, and referenced standards.

PART 3 - EXECUTION

3.1 PRIME COAT

A. Application rates and construction requirements shall be as specified in ALDOT Section 401, Bituminous Surface Treatments, for a Bituminous Treatment Type "A" which is a prime coat.

3.2 TACK COAT

A. Construction requirements, including preparation of the existing surface or substrate and maximum application rates, are specified in ALDOT Article 405.03.

3.3 PLANT MIX BITUMINOUS CONCRETE BINDER LAYER AND BITUMINOUS CONCRETE WEARING SURFACE

A. Construction requirements, including finished surface tolerance, density requirements, and maintenance and protection shall be as specified in ALDOT Articles 410.03 through 410.07, 327.03 and 424.04, as applicable. Rate of application shall be not less than the number of pounds per square yard for a 1-inch wearing surface or pavement patching layer, pro-rated for other thicknesses, as required by referenced ALDOT Specifications.

3.4 CRUSHED AGGREGATE BASE

A. Construction requirements shall comply with the ALDOT Specifications for the materials indicated, including in part, applicable portions of Section 825, Type B and ALDOT Section 301; compacted in accordance with the recommendations made in the geotechnical investigation.

3.5 COMPACTION EQUIPMENT

A. Compaction equipment shall be self-propelled, capable of compacting the mixture throughout the depth of the layer while it is still in a workable condition without damage to the material.

1. Self-propelled rollers shall have a minimum weight of 10 tons.

3.6 PAVEMENT PATCH

A. Saw cut perimeter of existing paving to a neat straight line where removal is indicated and/or required.

1. Protect edges of paving and base exposed to prevent cracking, breaking-up, wash-out, erosion, and/or other damage; apply prime coat as specified and at all such vertical edges prior to placing new pavement.

B. Patch pavement with components stated in Paragraph 1.2-B above, in compliance with each component's specified requirements, and as per details and sections on Drawings, if any.

END OF ASPHALT PAVING

SECTION 32 1313

CONCRETE PAVING

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.

B. Related work specified elsewhere includes:

.. Section 31 2000 - "Earth Moving"
.. Section 03 3100 - "Concrete"
.. Section 07 9000 - "Joint Sealers"

1.2 DESCRIPTION OF WORK:

A. Extent of portland cement concrete paving is shown on drawings, including exterior walks, paving, entry pads, dumpster pads, and mechanical equipment pads.

1.3 QUALITY ASSURANCE:

A. Codes and Standards: Comply with "Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction," latest edition, and local governing regulations if more stringent than herein specified.

B. Testing: All laboratory and field testing required to ensure compliance with these specifications will be performed by a qualified independent testing laboratory. Refer to Section 01 0150 - "Special Conditions", for additional information and requirements.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Forms:

1. Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

2. Use flexible spring steel forms or laminated boards to form radius bends as required.

3. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

B. Welded Wire Mesh:

1. Welded plain cold-drawn steel wire fabric, ASTM A 185.

a. Size: 6” x 6” #6, unless indicated otherwise.

2. Furnish in flat sheets, not rolls, unless otherwise acceptable to Engineer, for all concrete paving subject to possibility of bearing the weight of vehicular traffic.

3. Furnish in rolls for all concrete paving accessible only to pedestrian traffic, unless indicated otherwise on structural drawings.

4. Locations for Use: All concrete pads and paving, at 1/3 of total depth of concrete from top of slab.

C. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 40 or 60.

D. Concrete Materials: Comply with requirements of Section 03 3100 - “Concrete”, for concrete materials, admixtures, bonding materials, and other materials as required.

E. Expansion Joint Materials: Comply with requirements of Section 07 9000 - “Joint Sealers” for preformed and pourable expansion joint fillers and sealers.

F. Curing and Sealing Compound: Conform to TT-C-800, with 30% solids content minimum.

2.2 CONCRETE MIX, DESIGN AND TESTING:

A. Comply with requirements of Section 03 3100 - “Concrete”, for concrete mix design, sampling and testing, and quality control, and as herein specified.

B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (super-plasticizer), air-entraining admixture and water to produce the following properties:

1. Sidewalks, curbs and gutters, entry pads, and mechanical equipment pads subject only to pedestrian traffic:

a. Compressive Strength: 3,000 psi, minimum at 28 days.
b. Maximum Slump: 3"
c. Air Content: 2.5% to 6%
d. Thickness: 6", unless indicated otherwise.
e. Compacted Subgrade: 6" crushed aggregate base on compacted subgrade (98% S.P.D.).

2. Paving and pads subject to vehicular traffic, valley gutters, dumpster pads, and where indicated:

a. Compressive Strength: 4,000 psi, minimum at 28 days (minimum 550 psi flexural strength) in accordance with ALDOT Section 450 – "Portland Cement Concrete Pavement", of the Alabama Department of Transportation, Standard Specifications for Highway Construction, most current edition.

b. Maximum Slump: 3.5”
c. Air Content: 2.5% to 6%
d. Thickness: 6", unless greater thickness is indicated on the Drawings.
e. Subgrade: Unless otherwise indicated on the Drawings, 6" dense graded aggregate base, ALDOT Section 825, Type B (98% M.P.D.), installed in accordance with construction requirements for the materials indicated, including in part, applicable portions of Section 825 and Section 301.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

A. Remove loose material from compacted subbase surface immediately before placing concrete.

B. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

C. Subgrade shall be approved by the Owner's Geotechnical Engineer before paving begins.

3.2 FORM CONSTRUCTION:

A. Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8" in 10'.

2. Vertical face on longitudinal axis, not more than 1/4" in 10'.

C. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3.3 REINFORCEMENT:

A. Locate, place and support reinforcement as specified in Section 03 3100 – “Concrete”, unless otherwise indicated. Install welded wire fabric in as long lengths as practicable, lapping at least on mesh.

3.4 CONCRETE PLACEMENT:

A. Comply with requirements of Section 03 3100 - “Concrete”, for mixing and placing concrete, and as herein specified.

B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase, if required, to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with core to prevent dislocation of reinforcing, dowels, and joint devices.

1. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2-hour, place a construction joint.

3.5 JOINTS:

A. General: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. Weakened-Plane (Contraction) Joints:

1. Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows below.

2. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

3. Sidewalks shall be scored at 5-foot intervals unless otherwise indicated.

C. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2-hour, except where such placements terminate at expansion joints.

D. Expansion Joints:

1. Provide expansion joints with premolded joint filler at locations abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.

2. Extend joint fillers full-width and depth of joint.

3. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

4. Expansion joints for sidewalks shall be placed at 30-foot maximum intervals and along all intersections with other walks, steps, curbs, or other vertical surfaces.

E. Fillers and Sealants: Comply with the requirements of Section 07 9000 - “Joint Sealers”, for preparation of joints, materials, installation and performance.

3.6 CONCRETE FINISHING:

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Using hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs and formed joints with an edging tool, and round to 1/4" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling, when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

1. Light and smooth broom finish, by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation as required to provide a fine line texture acceptable to Architect.

E. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.

F. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

1. Provide rubbed finish for exposed edges of concrete work, and apply light and smooth broom finish.

3.7 CURING:

A. Protect and cure finished concrete paving, complying with applicable requirements of Section 03 3100 - “Concrete”. Use curing and sealing compound or approved moist-curing methods.

B. Begin initial curing as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Continue curing by use of moisture-retaining cover or membrane-forming curing compound. Cure formed surfaces by moist curing until forms are removed. Provide protections as required to prevent damage to exposed concrete surfaces.

3.8 REPAIRS AND PROTECTIONS:

A. Repair or replace broken or defective concrete, as directed by Architect.

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 resign grout.

C. Protect concrete from damage until acceptance of work. 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.

1. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

END OF CONCRETE PAVING

SECTION 32 1613

CURBS AND GUTTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division I Specification Sections, apply to this section.

B. Related work specified elsewhere includes:

.. Section 31 2000 - "Earth Moving"
.. Section 32 1313 - "Concrete Paving"
.. Section 03 3100 - "Concrete"
.. Section 07 9000 - "Joint Sealers"

1.2 DESCRIPTION OF WORK

A. Work described in this section includes the construction of new concrete curbs and gutters, and/or straight curbs where indicated, and patching between any existing paving and new curb and gutters, sidewalks, etc., to match existing pavement.

B. Refer to Drawings and Owner's Report of Geotechnical Exploration, for additional information and base requirements.

C. Refer to Section 31 2000 - "Earth Moving" for subgrade requirements below and beyond curbs and gutters.

D. Refer to Section 32 1313 - "Concrete Paving", for valley gutters, turn-outs, and paving.

1.3 QUALITY CONTROL

A. Certifications: The Contractor shall submit to the Architect copies of certificates from suppliers of ready-mix concrete, reinforcing steel, curing material, joint fillers, and other manufactured items, certifying that these products comply with the specifications and standards listed hereinafter.

B. Standard Specifications: Unless otherwise noted, all specifications referred to shall be the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest edition.

C. Testing: All laboratory and field testing as required to ensure compliance with these specifications shall be performed by a qualified independent testing laboratory. Refer to Section 01 0150 - "Special Conditions", for additional information.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Concrete shall be Class "A", Type 4 (3,000 psi), in accordance with Section 501, "Structural Portland Cement Concrete", of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest edition. A modified mix shall be used if optional machine laid curb and gutter is constructed.

B. Reinforcing steel, where called for on the drawings, shall meet the requirements of Section 502, "Steel Reinforcement".

C. Curing material shall be either burlap cloth, waterproof paper, polyethylene sheeting, or impervious membrane specified in ALDOT Articles 830.01 and 830.02.

D. Joint filler and sealer for expansion and construction joints shall meet the appropriate requirements of ALDOT Section 832, and Section 07900 - "Joint Sealers" herein.

E. Asphalt for repairs shall comply with referenced ALDOT Specifications, and city requirements, and shall match existing pavement at location(s) requiring patching.

PART 3 - EXECUTION

3.1 CURBS AND GUTTERS

A. Comply with requirements of Section 32 1313 - "Concrete Paving," Section 03 3100 - "Concrete," and the following:

1. Construction requirements, including foundation, forms, sections, joints, placing and finishing concrete, curing and protection, and backfilling shall be as specified in Article 623.03. Curbs and gutters shall match the profile of existing adjoining curb and gutter, if any, and otherwise as detailed.

2. Curb and gutter shall be constructed in sections having a maximum length of 10-feet. Transverse expansion joints with filler and joint sealer shall be installed at all curb returns and in curb and gutter at intervals not exceeding 40-feet. Similar joints shall be installed behind the curb where sidewalks adjoin the curb and gutter, and at all fixed objects which adjoin or extend through the curb and gutter.

3. Care shall be exercised that "tilt-out" curb and gutter is installed where pavement slopes away from the curb, and that 10-foot long transition sections are used where required to transition between "standard" and "tilt-out" curb and gutter.

3.2 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete, as directed by Architect.

B. Protect concrete from damage until acceptance of work. 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.

1. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

END OF CONCRETE CURBS AND GUTTERS

SECTION 32 1723

PAVEMENT MARKING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work described in this section includes marking of graphic symbols, lane separations, parking stripes, and lettering on concrete and asphalt pavements, if any, at locations indicated and as shown on the Drawings.

B. Related work specified elsewhere includes:
.. Section 32 1216 - “Asphalt Paving”
.. Section 32 1313 - “Concrete Paving”

1.2 QUALITY CONTROL

A. Certifications: The Contractor shall submit to the Architect copies of certificates from suppliers of materials, certifying that these products comply with specifications and standards listed hereinafter.

B. Standard Specifications: Unless otherwise noted, all specifications referred to shall be Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, most current edition.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paint for pavement marking shall be, traffic marking paint complying with Section 856, of the ALDOT specifications, and as follows:

1. Class 1, Type A (reflective) in public Right-of-Ways.
2. Class 1, Type B (non-reflective) within property lines of this project’s site, 2 coats.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING:

A. Each individual painted parking stripe shall be 4-inches wide, and shall be laid out as indicated on the drawings. Construction requirements shall conform to the applicable parts of Article 701.03 of the ALDOT Specifications for Class 1, Type as specified, traffic stripe.

1. Color shall be white for asphalt, yellow for concrete pavement, and international blue for striping and graphics for parking spaces for people with disabilities.
2. Use same materials and construction methods for any arrows and symbols indicated on paved areas.
3. Mark paving at each space for the people with disabilities with acceptable international graphics symbol, unless otherwise indicated, approximately 4' x 4' in size. Locate centered in space width and approximately 2'-0" from end of space where vehicle enters.

END OF PAVEMENT MARKING

SECTION 32 9100
PLANTING SOILS AND PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Existing Soil Modifications

B. Planting Soil Mixes

C. Fine Grading

1.02 RELATED SECTIONS

A. 32 9300 - Plants

1.03 REFERENCES

A. US Composting Council - www.compostingcouncil.org

B. Methods of Soil Analysis, published by the Soil Science Society of America - www.soils.org

1.04 DEFINITIONS

A. Modified Existing Soil: on-site soil that shall be used as Planting Soil after specified modifications.

B. Subgrade: surface or elevation of subsoil remaining after completion of excavation, or top surface of a fill or backfill, before placing Planting Soil.

C. Topsoil: naturally produced and harvested soil from the A horizon or upper layers of the pedosphere that have been stockpiled on site or imported.

D. Planting Soil (Planting Soil Mix): soil mixes described in PART 2 and Modified Existing Soils that will be used to support the life and health of plants after installation.

1.05 SUBMITTALS

A. Submit all product submittals eight weeks prior to the start of the soil work.

B. Submit 1-gallon samples of each Planting Soil Mix, Coarse Sand, and Compost detailed below to the Landscape Architect. Label each sample with the product/soil type name, characteristics, and locations in the Work. Samples shall be submitted at the same time as the analysis and report of that material.

C. Submit manufacturers or supplier’s product data and certified analysis for standard products and bulk materials, complying with testing requirements and referenced standards and specific requested testing.
   1. For each Compost product submit the following analysis by a recognized laboratory:
      a. pH
      b. Moisture content %, wet weight basis
   2. For Coarse Sand product submit the following analysis by a recognized laboratory:
      a. pH
      b. Particle size distribution.

D. Soil Testing Reports
   1. Submit soil test analysis for all Topsoils and Planting Soil Mixes included in Part 2 of this Section as well as for existing soils at the site.
      a. If tests fail to meet the specifications, obtain other sources of material, retest and resubmit until accepted by the Landscape Architect.
      b. Soil testing will be at the expense of the Contractor.
   2. Provide the following soil properties:
      a. Particle size analysis (% dry weight) and USDA soil texture analysis.

b. USDA gradation of gravel, coarse sand, medium sand, fine sand, silt, and clay.
c. pH and buffer pH.
d. Percent organic content by oven dried weight.
e. Nutrient levels by parts per million including: phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil.

1.06 QUALITY ASSURANCE

A. The installer shall be a firm having at least five years of experience in projects similar in scope and location (within Hardiness Zones 8a-9a) to that required for the Work. The installer of the Work in Section 32 9300 will be the same firm installing the Work in this section.
   1. There shall be an experienced full-time supervisor, who can communicate in English, on site during the installation of this Section's Work.

B. Soil testing laboratory shall be an independent laboratory, with experience and capability to conduct indicated testing and that specializes in USDA agricultural soil testing, soil mix testing, and other tests to be performed. Geotechnical engineering testing labs shall not be used.

C. Planting Soils shall conform to the approved submittal's sample color, texture and approved test analysis.
   1. The Landscape Architect may request samples of delivered or installed soil to be for testing to confirm Planting Soils' conformity to approved material.
   2. Testing shall be performed by the same soil testing laboratory that performed the original soil testing.
   3. Testing results shall be within 10% of values measured in approved Planting Soil Mixes.

D. Test soil compaction with a penetrometer following installation or modification of Planting Soil. Have a soil penetrometer and moisture meter on site at all times.

1.07 PRE-CONSTRUCTION MEETING

A. Schedule a pre-construction meeting with the Landscape Architect at least two weeks before beginning work to discuss the Work, administrative procedures during construction, and project schedule.

1.08 PERMITS AND REGULATIONS

A. Acquire all permits related to the Work. If a conflict exists between permit requirements and the work outlined in the contract documents, promptly notify the Landscape Architect in writing including a description of any necessary changes and the resulting changes to the contract price.

B. Adhere to all Federal, State, and local laws and ordinances bearing on the operation or conduct of the work as drawn and specified. This includes, but is not limited to all regulations relating to the inspection for disease and insect control.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Do not mix, deliver, place or grade soils when frozen or with moisture above field capacity.

B. Protect soil and soil stockpiles, including the stockpiles at the soil blender's yard, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Cover stockpiles with plastic sheeting or fabric at the end of each workday.

C. Coordinate bulk material delivery and storage with Landscape Architect and confine materials to neat piles in areas acceptable to Landscape Architect.

PART 2 PRODUCTS

2.01 COMPOST

A. Blended and ground leaf, wood and other plant-based material.
   1. Commercially prepared and meets the US Compost Council STA/TMECC criteria.
   2. Complies with the following parameters:
      a. pH: 5.5-8.0
      b. Soluble Salt Concentration: Maximum 10 dS/m.
      c. Moisture Content: 30 -60%
      d. Particle Size: 98% pass through ¾ inch screen or smaller.
      e. Stability: <8 mg CO2-C per g OM per day
      f. Maturity: Minimum 80%
      g. Physical Contaminants: < 1%
      h. Chemical Contaminants: Meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3.
      i. Biological Contaminants: Meet or exceed US EPA Class A standard, 40CFR § 503.32(a) levels.

2.02 COARSE SAND

A. ASTM C-33 Fine Aggregate, with a Fines Modulus Index of 2.8 and 3.2
   1. Clean, sharp, natural coarse sands free of limestone, shale and slate particles with a pH lower than 7.0.
   2. Particle size distribution:

3/8 inch (9.5 mm)	100%
No 4 (4.75 mm)	95-100%
No 8 (3.36 mm)	80-100%
No 16 (1.18 mm)	50-85%
No 30 (0.60 mm)	25-60%
No 50 (0.30 mm)	10-30%
No 100 (0.15 mm)	2-10%
No 200 (0.75 mm)	2-5%

2.03 TOPSOIL

A. Fertile, friable, naturally occurring soil containing less than 5% total volume of the combination of subsoil, refuse, roots larger than 1 inch diameter, heavy clay, stones larger than 2 inches, noxious weeds and seeds, sticks, brush, litter, or any substance that is harmful to plant growth.
   1. Complies with the following criteria:
      a. Soil texture: USDA loam, sandy clay loam or sandy loam with clay content between 15% and 25%. Combined clay/silt content of no more than 55%.
      b. pH value shall be between 5.5 and 7.0
      c. Percent organic matter (OM): 5.0% - 10%, by dry weight.
      d. Soluble salt level: less than 2 mmho/cm.
      e. Soil chemistry suitable for growing the plants specified.
   2. Topsoil existing at the site may be acceptable if it meets the above citeria.

2.04 PLANTING SOIL MIXES

A. PLANTING SOIL MIX 1 - Moderately slow draining soil for trees and shrub beds.
   1. A mix of Imported Topsoil, Coarse Sand, and Compost. The approximate mix ratio shall be:

Imported Topsoil(unscreened)	45-50%

Coarse Sand	40-45%
Compost	10%

2. *Mix component % by moist volume
3. Final tested organic matter between 2.75%-4% by dry weight.
4. Mix Coarse Sand and Compost first, then add Imported Topsoil. Mix with loader bucket, do not over mix. Do not use soil blending machine, do not screen the soil. Clumps of soil, Compost, and Coarse Sand will be permitted in overall mix.
5. Add fertilizer according to rates recommended by the soil tests at time of final grading.

2.05 FERTILIZER

A. Fertilizer types and rates are determined upon the soil tests results. Recommended fertilizer shall be added to soil mixes prior to final screening and prior to delivery to project site.

2.06 LIME

A. ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: T, with a minimum of 99 percent passing through No. 8 (2.36 mm) sieve and a minimum of 75 percent passing through No. 60 (0.25 mm) sieve.
   2. Form: Provide lime in form of finely ground dolomitic limestone.

PART 3 EXECUTION

3.01 SITE CONDITIONS:

A. Coordinate the Work of this Section with that of other trades.

B. Be aware of all surface and sub-surface conditions, including utilities, and notify the Landscape Architect, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.
   1. Notification of Local Utility Locator Service, 811, is required for all areas within project area: The Contractor is responsible for knowing the location and avoiding utilities that are not covered by the Local Utility Locator Service.

C. Prior to installation of Planting
   1. Confirm that surfaces receiving Planting Soils or modifications to existing soils are free of construction debris, refuse, compressible or biodegradable materials, stones and sticks larger than two inches in diameter, soil crusting films of silt or clay that hinders drainage into subsoils, and/or standing water. Remove unsuitable material from site.
   2. Confirm no adverse drainage conditions are present.
   3. Confirm that utility work has been completed as indicated in the Drawings.
   4. Confirm that Irrigation work, which is shown to be installed below prepared soil levels, has been completed.

D. Notify the Landscape Architect immediately of unsatisfactory conditions.

3.02 PLANTING SOIL INSTALLATION

A. Excavate to the proposed subgrade. Do not over excavate compacted subgrades of adjacent pavements or structures. Maintain a supporting 1:1 side slope of compacted subgrade material along edges of all paving and structures where the bottom of paving or structure is above bottom elevation of excavated planting area.
   1. Prior to installing Planting Soil, the Landscape Architect shall approve the condition of the subgrade, subgrade preparation, and subsurface drainage.
   2. Slope subgrade elevations approximately parallel to finished grade elevations and/or towards the subsurface drain lines as indicated in the Drawings.
   3. Landscape Contractor shall coordinate with General Contractor to verify that all finished grades are correct with proper topsoil and sod.

B. Equipment used to install or grade Planting Soils shall be wide tracked or balloon tire machines rated with a ground pressure of 4 psi or less. All grading and soil delivery equipment shall have buckets equipped with 6-inch teeth to scarify any soil that becomes compacted.

C. Scarify the subgrade material to a depth of 3-6 inches with the teeth of the back hoe, loader buckets, tiller or other suitable device.
   1. If area becomes overly compacted, loosen again prior to installing the Planting Soil.

D. Install Planting Soil in 12-18-inch lifts to required depths. Apply compacting forces to each lift as required to attain required compaction. Scarify the top of each lift 3-6 inches prior to adding another lift.

E. Phase work such that equipment does not have to operate over previously installed Planting Soil.

F. Where possible, place large trees first and fill Planting Soil around root ball.

G. The depths and grades shown on the drawings are the final grades after settlement and shrinkage of the compost material. Install Planting Soil at a higher level to anticipate the reduction of volume.

3.03 COMPACTION REQUIREMENTS FOR INSTALLED OR MODIFIED PLANTING SOIL

A. Soil compaction shall have a density between 75-250 psi as determined by a penetrometer at a soil moisture approximately midway between wilting point and field capacity.
   1. Existing Soil Modifications: compaction measured to depth of modification.
   2. Installed Planting Soil: compaction measured to depth of installation.

B. Maintain moisture conditions within the Planting Soil during installation or modification to allow for satisfactory compaction. Suspend operations if Planting Soil becomes too wet, apply water if the soil is overly dry.

C. Provide adequate equipment to achieve consistent and uniform compaction of the Planting Soils. Use the smallest equipment that can reasonably perform the task of spreading and compaction.

D. Do not pass motorized equipment over previously installed and compacted soil except as authorized below:
   1. Light weight equipment such as trenching machines or motorized wheel barrows.
   2. Follow the requirements of Over Compaction Reduction if work after the installation of the Planting Soil compacts the Planting Soil to levels greater than the above requirements.

3.04 OVER COMPACTION REDUCTION

A. Dig up and reinstall any soil that becomes compacted to a density greater than the specified density. This includes compaction caused by other subcontractors after the Planting Soil is installed and approved.

B. Roto tilling shall not be considered adequate to reduce over compaction at levels six inches or below finished grade.

3.05 FINE GRADING

A. The Landscape Architect shall approve all rough grading prior to the installation of Compost, fine grading, planting, and mulching.
   1. Rough grades should be held at 4-inches below finished grade to allow for topsoil and sod thickness.

B. Grade the finish surface of all planted areas to meet the grades indicated on the Drawings, allowing finished grades to remain higher (10-15% of soil modification depth) than the grades on the grading plan to anticipate settlement over first year.

C. Utilize hand equipment, small garden tractors with rakes, small garden tractors with buckets with teeth for fine grading to keep surface rough without further compaction. Do not use float bottom of loader bucket.

D. Provide for positive drainage from all areas toward inlets, drainage structures, and/or edge of planting beds. Adjust grades as directed to reflect actual constructed field conditions of pavements, walls, and inlet elevations. Notify the Landscape Architect if positive drainage is impossible to achieve.

E. Provide smooth, rounded transitions between slopes of different gradients and direction.

F. Fill all dips and remove any bumps in the overall plane of the slope.

3.06 CLEAN-UP

A. Keep site free of trash, pavements reasonably clean and work area in an orderly condition at end of each day. Remove trash and debris from site no less than once a week.

B. Protect adjacent walls, walks, and utilities from damage or staining by the soil.

C. Wash all soil from pavements and structures after installation is complete and as needed to prevent damage or staining.

D. Make all repairs to grades, ruts, and damage done to the Work.

E. Remove and dispose of excess soils.

3.07 PLANTING SOIL PROTECTION

A. Protect installed and/or modified Planting Soil from damage including contamination and over compaction due to other soil installation, planting operations, and operations by other contractors or trespassers.
   1. Repair or replace damage done by the Contractor to any part of the Work, existing features to remain on site, and features adjacent to the site at no expense to the Owner.

B. Provide temporary erosion control as needed to stop soil erosion until the site is stabilized with mulch, plantings, or turf.

3.08 SUBSTANTIAL COMPLETION ACCEPTANCE

A. The date of Substantial Completion of the Planting Soil is the same as the date of Substantial Completion for Section 32 9300 - Plants.

3.09 FINAL ACCEPTANCE

A. The date of Final Acceptance follows the same criteria as outlined in Section 32 9300 - Plants in addition to the following:
   1. Restore any soil settlement and or erosion areas to the grades shown on the drawings. Remove plants and mulch before adding soil and then restore planting. Do not add soil over the root balls of plants or on top of mulch.

END OF SECTION

SECTION 32 9300
PLANTS

PART 1 GENERAL

1.01 SUMMARY/SECTION INCLUDES

A. Tree, shrub, ornamental grass, perennial, and groundcover installation.

B. Post-planting fertilization.

C. Landscape bed edging and mulch.

D. Interim landscape management.

1.02 RELATED SECTIONS

A. 32 9100 - Planting Soil and Preparations

1.03 REFERENCES

A. When the following referenced standards are in conflict with this specification, the requirements of this specification shall prevail.
   1. ANSI Z60.1 - *American Standard for Nursery Stock*, most current edition.
   2. ANSI A 300 - *Standard practices for Tree, Shrub and other Woody Plant Maintenance*, most current edition and parts.
   3. Reference the following documents for interpretation of plant names and descriptions. Botanical names take precedence over common names. Names not listed in the above standards shall comply with those most commonly used in the trade. Where the names or plant descriptions disagree between the several documents, the most current document shall prevail.
      a. *Manual of Woody Landscape Plants*; Michael Dirr; Stipes Publishing, Champaign, IL, most current edition.
      b. *Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada*, MacMillan Publishing Company, Inc., New York 1976 Edition.

1.04 SUBMITTALS

A. Submit Proof of Contractor Qualifications as specified in “Quality Assurance” article of this Section including a list of the five completed projects with project name, address, names of Architects and Owners, overall description of scope work, and contract value.

B. Submit list of plant materials and unit prices demonstrating source and availability within ten days of award of Contract.
   1. Include name and address of nurseries. Include quantities, botanical names, common names, and sizes of plant materials.
   2. Substitutions are not permitted unless proof is submitted to the Landscape Architect that the plant is unavailable as specified. Request for substitution shall be accompanied with a list of contacted nurseries and sources of potential substitutions that may be of a different size, habit, species and/or cultivar.

C. Deliver all certificates of inspection to the Landscape Architect.

D. Submit fertilizer manufacturer's product literature, instructions, and guaranteed analysis data.

1.05 QUALITY ASSURANCE

A. Hold an Alabama General Contractor’s License for Classification S - Specialty Construction, Subclassification 4 - Landscaping. Firm experienced in the successful installation of a minimum of five projects within the last five years similar in scope, quality, contract value, and location (within Hardiness Zones 8a-9a) to that indicated for this project. Firm shall have sufficient manpower, equipment and financial resources to complete the Work of this Section.

B. Use adequate numbers of skilled workmen trained and experienced in the Work and familiar with requirements and methods needed for performance of the Work. Have a person knowledgeable in horticultural practices as an onsite superintendent at all times.

C. Observation of the Work:
   1. The Landscape Architect may observe the work at any time and shall be notified prior to the start of planting, at the completion of plant layout, and at the completion of the planting.
   2. The Landscape Architect shall be given the opportunity to tag and review trees in the field or nursery prior to digging. Provide written request to tag trees at least 3 months prior to date of install. If tagging is not undertaken by Landscape Architect, pictures of each tree may be requested to document tree quality prior to install.
   3. The Landscape Architect may review all plants for quality, character, form, and overall health. All plant material is subject to inspection and rejection at any time before, during, or after planting.
   4. Attach secure, durable, legible waterproof labels, stating correct botanical and common name to at least one plant of each plant variety.
   5. Approval is for visual qualities only and does not relieve the Contractor of his obligation to provide materials and workmanship in full compliance with the requirements of the Contract Documents.

D. Re-execute any work that fails to conform to the requirements of the contract and remedy defects due to faulty materials or workmanship upon written notice from the Landscape Architect, at the soonest possible time that can be coordinated with other work and seasonal weather demands.

1.06 PRE-CONSTRUCTION MEETING

A. Landscape Pre-Construction Meeting: Schedule a meeting with the Landscape Architect and ACCS Representative at least two weeks before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

B. Sod Installation Pre-Construction Meeting: Schedule a meeting with the Landscape Architect and ACCS Representative when subgrade has been prepared for sod installation to review and approve subgrade.

1.07 SELECTION, OBSERVATION AND APPROVAL OF PLANTS

A. Purchase trees from the growing nursery. Do not use re-wholesale plant suppliers for trees unless the Contractor can certify that the required trees are not directly available from a growing nursery. Refer to Drawings for pre-approved nurseries.

B. Remove all rejected plants from the site within five days and provide acceptable replacement plants at no expense to the Owner.

1.08 DEFINITIONS

A. End of Warranty Final Acceptance: The date when the Landscape Architect accepts that the plants and Work in this section meet all the requirements of the warranty. It is intended that the materials and workmanship warranty for Planting, Planting Soil, and Irrigation work run concurrent with each other.

B. Healthy: Plants that are growing in a condition that expresses leaf size, crown density, color, and with annual growth rates typical of the species' and cultivar's horticultural description.

C. Plants or plant materials: Any living, vegetative organism listed in the Plant Schedule within the Drawings.

D. Planting Soil: Refer to Section 32 9100 Planting Soils and Preparation.

E. Root ball: The mass of roots including any soil or substrate that is shipped with the tree within the root ball package.

F. Root ball package. The material that surrounds the root ball during shipping. The root package may include the material in which the plant was grown, or new packaging placed around the root ball during shipping.

G. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil, and Irrigation installation where the Landscape Architect accepts that all work in these sections is complete and the Warranty period has begun. This date may be different than the date of substantial completion for the other sections of the project.

1.09 PERMITS AND REGULATIONS

A. Acquire all permits related to the Work. If a conflict exists between permit requirements and the work outlined in the contract documents, promptly notify the Landscape Architect in writing including a description of any necessary changes and the resulting changes to the contract price.

B. Adhere to all Federal, State, and local laws and ordinances bearing on the operation or conduct of the work as drawn and specified. This includes, but is not limited to, all regulations relating to the inspection for disease and insect control.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Provide necessary protective covering during transport and delivery.

B. Deliver packaged materials (non-plant materials) in manufacturer's original containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site.

C. Deliver plants after preparations for planting have been completed and approved, and plant immediately.

D. Deliver and store all materials in a manner that prevents loss, damage, deterioration, or contamination.

E. Store all materials in approved locations to prevent loss, damage, deterioration, or contamination.

1.11 PLANT WARRANTY

A. Plants are warrantied to meet all the requirements for plant quality at installation in this specification. Defective plants shall be defined as plants not meeting these requirements and will be replaced by the Contractor.

B. Plant Warranty Period shall begin on the date of Substantial Completion Acceptance and will continue for one year.

C. Plants determined to be defective during Plant Warranty Period shall be removed immediately upon notification by the Landscape Architect and replaced at no cost to the Owner, as soon as weather conditions permit and within the specified planting period.

D. Any work required by this specification or the Landscape Architect during the progress of the work, to correct plant defects including the removal of roots or branches, or planting plants that have been bare-rooted during installation to observe for and correct root defects will not be considered grounds to void any conditions of the warranty. In the event the Contractor decides that such remediation work may compromise future health of the plant, the plant in question shall be rejected and replaced with plants that do not contain defects that require remediation or correction.

E. The Contractor is exempt from replacing plants, after Substantial Completion Acceptance and during the Plant Warranty Period, that are removed by others, lost or damaged due to occupancy of project, lost or damaged by a third party, vandalism, or any natural disaster.

F. The Contractor is exempt from warrantying plants that are not irrigated, including trees that have watering bags on them.

1.12 SITE MAINTENANCE

A. Keep roads, paving, and structures adjacent to maintenance operations clean and free of obstructions, mud, and debris at all times.

B. Do not permi flushing of roads or disposal of dirt or debris into sewers or dainage ditches.

C. Control dust from maintenance operations.

PART 2 PRODUCTS

2.01 PLANTS: GENERAL

A. Provide plants of quantity, size, genus, species, and variety and/or cultivar as indicated in the Plant Schedule. Plants are to adhere to the recommendations outlined in ANSI Z60.1 and trees shall be sourced from nurseries listed in the Drawings.

B. Provide healthy stock, grown in a nursery or greenhouse and reasonably free of die-back, disease, insects, eggs, bores, and larvae. Plants are to have a root system, stem, and branch form that will not restrict normal growth, stability and health for the expected life of the plant.
   1. Plant quality above the soil line:
      a. Trees shall have one central leader unless specified as multi-trunk.
      b. Main branches are to be distributed along the central leader not clustered together. They shall form a balanced, proportional crown appropriate for the cultivar/species.
      c. The attachment of the largest branches (scaffold branches) shall be free of included bark.
      d. The tree trunk shall be free of wounds that penetrate to the wood (properly made pruning cuts, closed or not, are acceptable and are not considered wounds), sunburned areas, fungal fruiting bodies, wood cracks, sap leakage, signs of boring insects, galls, cankers, girdling ties, or mechanical injury.
   2. Plant quality at or below the soil line:
      a. Roots shall be reasonably free of scrapes, broken or split wood, and free of injury from biotic agents.
      b. The root collar shall be within the upper two inches of the substrate/soil.
      c. The root system shall be reasonably free of stem girdling roots over the root collar or kinked roots from nursery production practices.

2.02 PLANTS: ROOT BALL PACKAGE OPTIONS

A. The following root ball packages are permitted for trees, shrubs, ornamental grasses, perennials, and groundcovers. Specific root ball packages shall be required where indicated in the Plant Schedule located in the Drawings. Root ball packaging is to conform to the standards of ANSI Z60.1 unless otherwise indicated.
   1. CONTAINER PLANTS (BOXES AND PLASTIC POTS):
      a. Container plants may be permitted for trees only when indicated in the Plant Schedule, in this specification, or as approved in writing by the Landscape Architect.
      b. Plants shall be established and well rooted in removable containers.

2.03 PLANTS: SEED

A. Use Winter Rye Grass as a temporary grass during the cool months, defined as October to March. Seed is to meet purity standards as outlined in ALDOT Standard Specifications, Section 860.01a.

B. Use Cynodon dactylon (Common Bermuda) for seeding during warm months, defined as April through September. Seed is to meet purity standard as outlined in ALDOT Standard Specifications, Section 860.01a. Seed at a rate of 50 lbs. per acre.

C. Do not broadcast or drop seed when wind velocity exceeds 10 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

D. Sow seed at a toatl rate of 1.5 lbs/1000 sf (Common Bermuda).

E. Rake seed lightly into top 1/8-inch of soil, roll lightly, and water with fine spray.

2.04 SOIL AND SOIL AMENDMENTS

A. Refer to Section 32 9100 - Planting Soils and Preparation for soil types and definitions.

2.05 POST PLANTING AMENDMENTS

A. Slow Release Fertilizer Tablets
   1. Manufacturers
      a. 20-10-5 Planting Tablets
         A.M. Leonard, Inc.
         PO Box 816
         Piqua, OH 45356
         937.773.2694
      b. Approved equal.

2.06 MULCH

A. All mulch types to be free from leaves, twigs, insects, grasses, weeds, plants and their seeds, other foreign materials and any substances harmful to plant growth. Types include:
   1. Pine straw - Longleaf Pine (P. palustris) needles.
      a. Unless otherwise indicated, use on slopes greater than 3:1
   2. Shredded Pine Bark.

B. Owner to select final mulch types.

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Coordinate the Work of this section with that of other trades.

B. Be aware of all surface and sub-surface conditions, including utilities, and notify the Landscape Architect, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.
   1. Notification of Local Utility Locator Service, 811, is required for all areas within project area: The Contractor is responsible for knowing the location and avoiding utilities that are not covered by the Local Utility Locator Service.

C. Section 32 9100 - Planting Soils and Preparation and Section 32 8000 - Irrigation work to be completed and accepted prior to the installation of any plants.

D. Perform planting during those periods when weather and soil conditions are suitable for planting in accordance with locally accepted horticultural practices and as approved by the Landscape Architect.
   1. Do not install plants into saturated or frozen soils. Do not install plants during inclement weather, such as rain or snow or during extremely hot, dry, cold or windy conditions.

3.02 SOIL PROTECTION DURING PLANT DELIVERY AND INSTALLATION

A. Protect soil from compaction during the delivery of plants to the planting locations, the digging of planting holes, and the installing of plants.
   1. Where possible deliver and plant trees that require the use of heavy mechanized equipment prior to final soil preparation and tilling.
   2. Till to a depth of 6 inches, all soil that has been driven over during the installation of plants.

3.03 LAYOUT AND PLANTING SEQUENCE

A. Notify the Landscape Architect one week prior to layout. Layout all individual tree and shrub locations. Place plants above surface at planting location or place a labeled stake at planting location. Layout bed lines with paint. Adjust plant layout as directed by the Landscape Architect.

B. Do not begin planting installation until given approval by the Landscape Architect.

C. When applicable, plant trees before other plants are installed.

3.04 PLANTS: GENERAL INSTALLATION

A. No more plants shall be distributed about the planting bed area than can be planted and watered on the same day.

B. Excavate the Planting Soil as indicated in the Landscape Details.
   1. For trees and shrubs planted in soil areas that are NOT tilled or otherwise modified to a depth of at least 12 inches over a distance of more than 10 feet radius from each tree, or 5 feet radius from each shrub, the soil around the root ball shall be loosened as defined below.
      a. The area of loosening shall be a minimum of 3 times the diameter of the root ball at the surface sloping to 2 times the diameter of the root ball at the depth of the root ball.
      b. Loosening is defined as digging into the soil and turning the soil to reduce the compaction. The soil does not have to be removed from the hole, just dug, lifted and turned. Lifting and turning may be accomplished with a tracked mini excavator, or hand shovels.
      c. Remove extraneous matter 1-2-inch or larger in any dimension from top 4-inches of placed topsoil.
   2. If an auger is used to dig the initial planting hole, the soil around the auger hole shall be loosened as defined above for trees and shrubs planted in soil areas that are NOT tilled or otherwise modified.
   3. The measuring point for root ball depth shall be the average height of the outer edge of the root ball after any required root ball modification.
   4. Uniformly grade areas including adjacent transistion areas to line and grade +/- 1/2-inch or as directed by Landscape Architect.

C. Set top outer edge of the root ball at the average elevation of the proposed finish unless otherwise indicated in the Planting Details. Set the plant plumb and upright in the center of the planting hole. The tree graft, if applicable, shall be visible above the grade. Do not place soil on top of the root ball.

D. The Landscape Architect may request that a plant’s orientation be rotated when planted based on the form of the plant.

E. Brace root ball by tamping soil around the lower portion of the root ball. Place additional soil around base and sides in six-inch lifts. Lightly tamp each lift using foot pressure or hand tools to settle backfill, support the tree and eliminate voids. Do not over compact the backfill or use mechanical or pneumatic tamping equipment.
   1. When the planting hole has been backfilled to three quarters of its depth, water shall be poured around the root ball and allowed to soak into the soil to settle the soil. Do not flood the planting space. If the soil is above field capacity, allow the soil to drain to below field capacity before finishing the planting. Air pockets shall be eliminated and backfill continued until the planting soil is brought to grade level.
   2. When backfilled to within 6-8 inches of finished grade, install slow-release planting tablets as directed by the manufacturer’s directions.

F. All trees to recieve (2) total slow release fertilizer tablets (1 on opposite sides), just outside the root ball within the tree hole, buried 3-inches below grade.

G. Thoroughly water the root ball and planting pit immediately after planting.

H. Remove all nursery plant identification tags, ribbons, ties, and trunk protection after planting is accept as described in Quality Assurance of this specification section.

I. Prune plants only as directed by the Landscape Architect.

3.05 PLANTS: ROOT BALL PACKAGES AND ADDITIONAL REQUIREMENTS

A. The following are additional planting requirements for the previously specified root ball packaging types and are to be followed during the planting process in addition to the above Plants: General Installation.

B. CONTAINER PLANTS
   1. Shave and scarify the root ball after removing the container.
   2. Remove all substrate at the bottom of the root ball that does not contain roots.

3.06 STRAIGHTENING PLANTS

A. Maintain all plants in a plumb position throughout warranty period. Straighten all trees that move out of plumb including those not staked. Plants to be straightened shall be excavated and the root ball moved to a plumb position, and then re-backfilled.

B. Do not straighten plants by pulling the trunk with guys.

3.07 INSTALLATION OF FERTILIZER AND OTHER CHEMICAL ADDITIVES

A. Do not apply any soluble fertilizer to plants during the first year after transplanting unless soil test determines that fertilizer or other chemical additives is required. Apply chemical additives only upon the approval of the Landscape Architect.

B. Apply control released fertilizers according to manufacturer’s instructions and standard horticultural practices.

3.08 PLANTING BED FINISHING

A. Smooth out grades between plants after planting and before mulching.

B. Separate the edges of planting beds and lawn areas with a smooth, formed edge cut into the turf with the bed mulch level slightly lower than the adjacent turf/sod or as directed by the Landscape Architect.

C. Install metal edging as indicated in the Drawings.

3.09 MULCHING OF PLANTS

A. Apply mulch to the depth indicated in the Planting Details, covering the entire planting bed area unless otherwise directed. Install no more than 1 inch of mulch over the top of root balls. Taper mulch depth down to 2 inches when abutting pavement.

B. For trees planted in lawn areas, the mulch shall extend to a 4-foot radius around the tree or to the extent indicated on the plans.

C. Lift all leaves, low hanging stems, and other green portions of small plants out of mulch if covered.

3.10 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants from the point of installation until the date of Substantial Completion Acceptance. The Contractor shall adjust the automatic irrigation system, if available, and apply additional water, or adjust for less, using hoses as required.

B. Hand water root balls of all plants immediately after planting to assure that the root balls have moisture above wilt point and below field capacity.

C. The Contractor shall install and maintain self-filling slow release watering bag/mats for each un-irrigated tree for the duration of the warranty period. Filling the bags with water shall be the responsibilty of the ower after Substantial Completion acceptance.
   1. Slow Release Water Bag/Mat: Install water bag/mat in areas indicated on plan where no irrigation is installed. Place water bag/mat at trees according to manufacturer's recommendation. Coordinate work with Owner. Watering bags shall remain the property of the Owner at the completion of the Work.
      a. Acceptable Manufacturer and Product:
         1) TreeDiaper 36 by Zynnovation, LLC or approved equal.
            Zynnovation LLC
            9424 Atlee Commerce Boulevard, Suite e
            Ashland, VA 23005
            540-300-1465
            info@treediaper.com

3.11 PROTECTION DURING CONSTRUCTION

A. Protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers. Maintain protection during installation until Substantial Completion Acceptance. Treat, repair or replace damaged work immediately.

B. Damage done by the Contractor, or any of their sub-contractors to existing or installed plants, or any other parts of the work or existing features to remain, including those on adjacent property, shall be cleaned, repaired, or replaced by the Contractor at no expense to the Owner. The Landscape Architect shall determine when such cleaning, repair, or replacement is satisfactory.

3.12 CLEAN UP

A. Keep site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.
   1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Wash all soil from pavements and other structures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site.
   1. Tags mentioned in Quality Assurance Article of this Section are to remain until End of Warranty and Final Acceptance.

C. Make all repairs to grades, ruts, and damage by the plant installer to the work or other work at the site.

D. Remove and dispose of all excess planting soil, subsoil, mulch, plants, packaging, and other material brought to the site by the Contractor.

3.13 INTERIM PLANT MANAGEMENT

A. Maintain all plants and planted areas during the project work period and prior to Substantial Completion Acceptance.
   1. Maintenance during the period prior to Substantial Completion Acceptance shall consist of pruning, watering, cultivating, weeding, mulching, removal of dead plant material, repairing/replacing/tightening of tree guying materials, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings reasonably free of damaging insects and disease, and in healthy condition. The

threshold for applying insecticides and herbicides shall follow established Integrated Pest Management (IPM) procedures. Mulched areas shall be kept reasonably free of weeds and grass.

3.14 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Landscape Architect shall review the work and decide if the work is substantially complete.
   1. Notify the Landscape Architect at least 7 days prior to the requested review date.
   2. The Landscape Architect may develop a “punch list” that describes the work to be completed or amended before Substantial Completion is granted. After the Contractor has completed the items on the punch-list, the Contractor may request another review by the Landscape Architect.

B. The date of Substantial Completion of the planting shall be the date when the Landscape Architect accepts that all work in the following sections are complete:
   1. 32 9100 - Planting Preparation & Soils
   2. 32 9300 - Planting

C. The Plant Warranty Period begins at the date of written notification of Substantial Completion from the Landscape Architect. The date of Substantially Completion for the Sections listed above may be different than the date of Substantial Completion for the other Sections of the Work.

3.15 END OF WARRANTY & FINAL ACCEPTANCE

A. Contractor is responsible for contacting the Landscape Architect at the end of the Plant Warranty Period to schedule final inspection. Should the contractor fail to contact the Landscape Architect, the Plant Warranty Period is automatically extended until he/she does so.

B. At the end of the Plant Warranty Period, submit request for inspection for Final Acceptance to Landscape Architect at least one week prior to anticipated date of inspection; include list of Work substantially accepted and list of Work replaced during Warranty Period.

C. Upon request for inspection, jointly review with Landscape Architect all guaranteed Work for Final Acceptance.

D. Remove tree guying apparatus and saucers from all trees, unless otherwise directed; replace mulch to specified thickness.

E. Upon completion by the Contractor of all required repairs and replacements, the Landscape Architect will confirm the date of Final Acceptance of the Work.

END OF SECTION

SECTION 33 1000

WATER UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere includes:

1. Section 31 2000 - “Earth Moving”
2. Division 22 – Plumbing

1.2 SUMMARY:

A. This Section includes water service piping system, meter, vaults, valves, and appurtenances from the existing on-site utility source of potable water to a point 5 feet outside the building, and as indicated on the Drawings, and in this Section of the Project Manual.

B. Note that the Contractor shall furnish and install connection, water meter, etc., acceptable to the utility company and call on the utility company to approve the meter and inspect the installation prior to covering.

C. All fees and charges for water service, meters, taps, permits, impact fees, etc., if any, shall be paid by the Contractor from their contract amount.

D. The extent of water service piping system, fire hydrants, etc., is indicated on the Drawings, in this Section, other referenced Sections of the Project Manual, and as otherwise required by authorities having jurisdiction.

1. All water pipe which run under roads, streets, driveways, and other vehicular paving shall be sleeved in AWWA C151 ductile iron sleeves.

E. Utility Compliance: Comply with Authority Having Jurisdiction regulations and standards pertaining to water distribution systems.

1. Where conflicts or discrepancies occur with the plans or these specifications, Authority Having Jurisdiction regulations and standards shall govern.

1.3 SUBMITTALS:

A. General: Submit the following in accordance with conditions of Contract and Division 1 Specification Sections

1. Product data for water service piping and fire protection pipe and specialties.

2. Shop drawings for water vaults, including lids.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS - GENERAL:

A. General: Pipe, valves, fittings and installation in R.O.W. and on site shall comply with requirements of this Section, other referenced Sections of the Project Manual, the Drawings, and the Authority Having Jurisdiction.

1. Pipe, fittings, hydrants and valves shall be as specified herein, subject to acceptance by the Authority Having Jurisdiction, unless other specific materials acceptable to the Authority Having Jurisdiction are indicated on the Drawings.

2. PVC piping and fittings 4" and smaller shall be C900 PVC, Class 200 plastic pipe, Schedule 40, or Type K Copper; and pipe 4" and larger, below paving and fire lines shall be ductile iron, of type(s) acceptable to the Authority Having Jurisdiction, unless other specific materials acceptable to the Authority Having Jurisdiction are indicated on the Drawings.

B. PVC Plastic, Schedule 40 PVC with pressure-rated fittings: Conform to ASTM D 1785 standard specifications for PVC plastic pipe.

C. PVC Plastic, Water Pipe: AWWA C900, Class 200. Include elastomeric seal according to ASTM F477.

1. Ductile Iron Fittings: AWWA C110, ductile-iron; or AWWA C153, ductile-iron, compact type, and specifically designed for joining PVC pipe; Include elastomeric seals according to ASTM F 477 or as otherwise required for joining plastic pipe specified

2. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended in writing by piping system manufacturer, unless otherwise indicated.

D. Where copper pipe is indicated, provide Soft Copper Tube, ASTM B 88, Type K, water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

E. Ductile-Iron, Push-on-Joint Pipe: AWWA C151 and ANSI C150, C151, A21.50, and A21.15 respectively, Class 350 as approved by the Authority Having Jurisdiction, tar coated outside, with cement lining and seal coat according to AWWA C104. Include rubber compression gasket according to AWWA C111.

1. Ductile-Iron, Push-on-Joint Fittings: AWWA C110, ductile-iron; or AWWA C153, ductile-iron, compact type. Include cement-mortar lining and seal coat according to AWWA C104 and rubber compression gaskets according to AWWA C111 (ANSI 21.11) and according to ASTM D-3139.

2. Joining Materials: AWWA C111 rubber gaskets and lubricant according to ASTM F477 requirements.

F. Ductile-Iron, Mechanical-Joint Pipe: AWWA C151, with cement-mortar lining and seal coat according to AWWA C104. Include gland, rubber gasket, and bolts and nuts according to AWWA C111.

1. Ductile-Iron, Mechanical-Joint Fittings: AWWA C110, ductile-iron; or AWWA C153, ductile-iron, compact type. Include cement-mortar lining and seal coat according to AWWA C104 and glands, rubber gaskets, and bolts and nuts according to AWWA C111.

2. Joining Materials: AWWA C111 ductile-iron or gray-iron glands, high-strength steel bolts and nuts, and rubber gaskets.

G. PE Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

H. Pipe Sleeves: Provide pipe sleeves at least one size larger than water service piping required below existing concrete and paving, and as follows.

1. Below Concrete, Entry Pads, and Paving Subject to Only Pedestrian Traffic, and for Future Irrigation: Schedule 40 PVC.

2. Below Concrete, Equipment Pads, Dumpster Pads, Valley Gutters, Curbs and Gutters, Paving Subject to Vehicular Traffic, and Where Indicated: Ductile Iron, as specified above herein this Section.

I. Identification for Underground Plastic Pipe:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allen Systems, Inc.; Reef Industries, Inc.
b. Brady (W.H.) Co.; Signmark Div.
c. Calpico, Inc.
d. Carlton Industries, Inc.
e. EMED Co., Inc.
f. Seton Name Plate Co.

2. Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in blue letters "CAUTION - WATER LINE BURIED BELOW."

PART 3 - EXECUTION:

3.1 INSTALLATION:

A. Comply with requirements of Division 22, the International Plumbing Code, Drawings, the Authority Having Jurisdiction and requirements of other authorities having jurisdiction.

B. Comply with requirements of the State Health Department, the local Health Department, and authorities having jurisdiction.

3.2 DEPTH OF COVER:

A. Provide minimum cover of 36-inches for all water bearing piping.

3.3 INSTALLATION OF IDENTIFICATION:

A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate 6 to 8 inches below finished grade, directly over piping.

3.4 CLEANING:

A. Clean and disinfect water distribution piping as follows, or as required by utility company, Code, and authorities having jurisdiction:

1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired, prior to use.

2. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction or, in case a method is not prescribed by that authority, use the procedure described in AWWA C651, or as described below:

a. Fill the system or part thereof with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.

b. Drain the system or part thereof of the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.

c. Following the allowed standing time, flush the system with clean, potable water until chlorine does not remain in the water coming from the system.

d. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

B. Prepare reports for all purging and disinfecting activities, and submit for review and along with each set of “Record Documents”.

END OF WATER SERVICE PIPING

SECTION 33 3000

SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere includes:

1. Section 31 2000 - “Earth Moving”
2. Section 03 3100 - “Concrete”
3. Division 22 - “Plumbing”

1.2 SUMMARY:

A. This Section includes sanitary sewerage system piping and appurtenances from a point 5 feet outside the building to the point of disposal.

B. The extent of sanitary sewerage system is indicated on the Drawings, in this Section 33 3000, and as otherwise required by authorities having jurisdiction.

C. All fees and charges for sanitary sewerage service, taps, connections, permits, impact fees, etc., shall be paid by the Contractor from their contract amount.

1.3 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for drainage piping and specialties.
2. Test Reports.

1.4 QUALITY ASSURANCE:

A. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to sanitary sewerage systems.

B. Utility Compliance: Comply with Authority Having Jurisdiction regulations and standards pertaining to sanitary sewerage systems.

1. Where conflicts or discrepancies occur with the plans or these specifications, the Authority Having Jurisdiction regulations and standards shall govern.

C. Health Department Compliance: Comply with the State Department of Health Code or the local Health Department code, regulations and standards, whichever is more stringent.

D. Comply with requirements of authorities having jurisdiction, when more stringent than specified or otherwise indicated.

1.5 PROJECT CONDITIONS:

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations. Verify that sanitary sewerage system piping may be installed in compliance with original design and referenced standards.

1.6 SEQUENCING AND SCHEDULING:

A. Coordinate any connection to public sewer with the Authority Having Jurisdiction.

B. Coordinate with interior building sanitary drainage piping.

C. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cleanouts:
   a. Ancon, Inc.
   b. Josam Co.
   c. Smith (Jay R.) Mfg. Co.
   d. Wade Div.; Tyler Pipe.
   e. Zurn Industries, Inc.; Hydromechanics Div.

2. Underground Warning Tapes:
   a. Allen Systems, Inc.; Reef Industries, Inc.
   b. Brady (W.H.) Co.; Signmark Div.
   c. Calpico, Inc.
   d. Carlton Industries, Inc.
   e. EMED Co., Inc.
   f. Seton Name Plate Co.

2.2 PIPE AND FITTINGS:

A. Ductile-Iron, Gravity Sewer Pipe and Fittings:

1. Pipe: Ductile iron pipe meeting AWWA C-150, C-151 and ANSI A21-50 and A 21.15 for coated outside and cement lined inside. Cement lining according to AWWA C104, Class 350.
2. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
3. Compact Fittings: AWWA C153, for push-on joints.

4. Gaskets: AWWA C111, rubber.

B. PE Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

C. Identification for Underground Plastic Pipe:

1. Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid yellow in color with continuously printed caption in red letters "CAUTION - SANITARY SEWER LINE BURIED BELOW."

2.3 CLEANOUTS:

A. General: Provide Mission adjustable repair coupling (or approved equal) with stainless steel bends and stainless-steel shear ring and a Zurn #ZN1400HD-3, Smith 4220 (or approved equal) cover set flush in a minimum 14" square concrete slab.

2.4 IDENTIFICATION:

A. Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid green in color with continuously printed caption in black letters "CAUTION - SEWER LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 PREPARATION OF FOUNDATION FOR BURIED SANITARY SEWERAGE SYSTEMS:

A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.

B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill according to provisions in Section 31 2000 – Earth Moving.

C. Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

3.2 PIPE APPLICATIONS FOR UNDERGROUND SANITARY SEWERS:

A. Refer to Paragraph 2.2 above.

3.3 INSTALLATION, GENERAL:

A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of the underground sanitary sewerage system piping. Location and arrangement of piping layout take into account many design considerations. Install the piping as indicated, to the extent practical.

B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals,

sleeves, and couplings in accordance with manufacturer's recommendations 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 fittings for changes in direction. Use fittings for branch connections, except where direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

E. Install piping pitched down in direction of flow, at minimum slope of 1 percent, except where indicated otherwise.

F. Extend sanitary sewerage system piping to connect to building sanitary drains, of sizes and in locations indicated.

G. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, jacking, or a combination of both.

3.4 PIPE JOINT CONSTRUCTION AND INSTALLATION:

A. Join and install ductile iron pipe per ALDOT Standard Specifications.

3.5 CLEANOUTS:

A. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated. Set cleanout lid in concrete block 14 by 14 by 12 inches deep, except where location is in concrete paving. Set top of cleanout 1 inch above surrounding earth grade or flush with grade when installed in paving.

3.6 TAP CONNECTIONS:

A. Make connections to existing piping and underground structures so that finished work will conform as nearly as practicable to the requirements specified for new work.

B. When tapping into existing man holes, use flexible rubber boot in accordance with authority having jurisdiction's requirements.

C. 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 3000-psi 28-day compressive-strength concrete.

D. Make branch connections from side into existing 4- to 21-inch piping by removing section of existing pipe and installing wye fitting, into existing piping. Encase entire wye with not less than 6 inches of 3000-psi 28-day compressive-strength concrete.

1. Provide 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, concrete, or other extraneous material that may accumulate.

3.7 INSTALLATION OF IDENTIFICATION:

A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate 6 to 8 inches below finished grade, directly over piping.

3.8 FIELD QUALITY CONTROL:

A. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

B. Cleaning: Clear interior of piping and structures of dirt and other 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 plugs in ends of uncompleted pipe at end of day or whenever work stops.
3. Flush piping between manholes, if required by local authority, to remove collected debris.

C. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

1. Make inspections after pipe between manholes and manhole locations has been installed and approximately 2 feet of backfill is in place, and again at completion of project.
2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects correct such defects, and reinspect.

END OF SANITARY SEWERAGE UTILITIES

SECTION 33 4001

STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere includes:

.. Section 31 2000 - "Earth Moving"
.. Section 03 3000 - "Cast-In-Place Concrete"

1.2 DESCRIPTION OF WORK:

A. Work described in this section includes the construction of new storm drainage pipe and structures as shown on the Drawings

1.3 QUALITY CONTROL:

A. Certifications: The Contractor shall submit to the Architect copies of certificates from suppliers of pipe, gaskets, reinforcing steel, cast iron downspout boots, cast iron frames, covers and grates, ready-mix concrete and other manufactured items, certifying that these products comply with the specifications and standards listed hereinafter.

B. Standard Specifications: Unless otherwise noted, all specifications referred to shall be the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2014 Edition or most current edition.

C. Testing: All laboratory and field testing as required to ensure compliance with these specifications will be performed by an independent testing laboratory.

D. Comply with requirements of the International Plumbing Code, the American Concrete Pipe Association, and authorities having jurisdiction, when more stringent than specified or otherwise indicated

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Where indicated, pipe smaller than 12-inches in diameter shall be Schedule 80 PVC, Contech A2000 PVC (or approved equal), or ADS N-12 HP HDPE, unless otherwise indicated on the drawings.

1. Where indicated on the Drawings for "french drain" or "perforated underdrain", pipe shall be equivalent to ADS N-12 (perforated) corrugated HDPE pipe with smooth interior or perforated Contech A2000 PVC, complete with filter fabric "sock" and all required or necessary system accessories, fittings, and components, as specified in Article 853.13.

B. Pipe larger than 12-inches (or equivalent area in arch pipe) shall be Class 3, minimum reinforced concrete pipe (RCP) as specified in Article 850, or as indicated on the Drawings.

C. Concrete and reinforcing steel for headwalls, inlets, manholes, and other storm drainage structures shall comply with Alabama Department of Transportation Specification Section 501, and Section 502. Concrete shall be Class "A", Type 2 (3,000 psi).

D. Masonry materials and precast concrete units shall conform to Article 621.02.

E. Castings for frames, covers and grates in drainage structures shall comply with ALDOT Section 836, with particular attention directed to ALDOT Article 836.04, 836.05, 836.06, and 836.07.

1. All manhole covers shall be round.

F. Identification for Underground Plastic Pipe:

1. Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid yellow in color with continuously printed caption in black letters "CAUTION – STORM SEWER LINE BURIED BELOW."

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allen Systems, Inc.; Reef Industries, Inc.
b. Brady (W.H.) Co.; Signmark Div.
c. Calpico, Inc.
d. Carlton Industries, Inc.
e. EMED Co., Inc.
f. Seton Name Plate Co.

PART 3 - EXECUTION

3.1 STORM DRAIN PIPE:

A. Construction requirements, including excavation of trench, placing pipe, and backfilling around pipe shall conform to the applicable portions of Article 530.03 of the Alabama Department of Transportation specifications.

B. Bedding for storm pipe shall be as shown on the Drawings and as per the pipe manufacturer's requirements, Type 3 or better installation. Open graded stone, such as #57 stone, is not allowed as backfill.

C. Compaction requirements for backfill shall be the same as specified for type of surface constructed over the trench, paved or planted areas as described in Section 31 2000 - "Earth Moving."

D. Properly coordinate with elevations of grades, footings, other below grade work, and etc.

3.2 INSTALLATION OF IDENTIFICATION:

A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate 6 to 8 inches below finished grade, directly over piping.

3.3 STRUCTURES:

A. Inlets, manholes, cleanouts and other storm drainage structures shall be installed or constructed in accordance with applicable portions of the following sections of the Alabama Highway Department Standard Specifications:

1. Section 501 - Structural Portland Cement Concrete.
2. Section 502 - Steel Reinforcement.
3. Section 613 - Brick and Concrete Block Masonry.
4. Section 620 - Minor Structure Concrete.
5. Section 621 - Inlets, Junction Boxes, Manholes and Miscellaneous Drainage Structures.
6. Section 622 - Resetting Gratings and Covers and for Catch Basins, Inlets, and Manholes.

END OF STORM DRAINAGE