

PROJECT MANUAL

May 21st, 2026

BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING

MARTINSVILLE, VIRGINIA 24112



Architect's Project Number: 2149-02

INVITATION IFB-52626

PREBID CONFERENCE: 10:00 AM, June 2nd, 2026
By MICROSOFT TEAMS MEETING (virtual), Registration Required.

BIDS DUE PRIOR TO 2:00 PM, July 2nd, 2026

OWNER:

BLUE RIDGE REGIONAL AIRPORT
525 AIRPORT RD
MARTINSVILLE, VIRGINIA 24112
PH: 276-957-2291

SECTION 00 01 02 - PROJECT INFORMATION

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

- A. Project Name: Blue Ridge Regional Airport
- B. The Owner, hereinafter referred to as Owner: Blue Ridge Regional Airport
- C. Owner's Project Manager: Jason Davis
 - 1. Blue Ridge Regional Airport – Managing Director
 - 2. Address: 525 Airport Road
 - 3. City, State, Zip: Martinsville, Virginia 24112
 - 4. Phone: 276-957-2291
 - 5. E-mail: jdavis@flyblueridge.com

1.02 NOTICE TO PROSPECTIVE BIDDERS

- A. These documents constitute an Invitation to Bid to General Contractors for the construction of the project described below.

1.03 PROJECT DESCRIPTION

- A. Summary Project Description: General Aviation Terminal Building
- B. Contract Scope: Construction.
- C. Contract Terms: Lump Sum

1.04 PROJECT CONSULTANTS

- A. The Architect, hereinafter referred to as Architect: PSH+
 - 1. Address: 1700 Willow Lawn Drive, Suite 200
 - 2. City, State, Zip: Richmond, VA 23230

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 00 21 00 – INVITATION TO BID

SUMMARY

1.01 SEE THE INVITATION TO BID FOLLOWING THIS PAGE

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	00 21 00 - 1	Invitation to Bid

INVITATION FOR BIDS

Responses to this solicitation will be accepted electronically through eVA (Virginia's e-Procurement Market Place). Guidance on how to submit a bid is available on eVA's website, go to <https://eva.virginia.gov/eva-vendor-training.html> and select the "Respond to IFBs-RFPs and more" PDF located under the heading "Find and Respond to Virginia Business Opportunities (VBO)". Contact eVA Customer Care at (866) 289-7367 if you have questions or need assistance.

Sealed bids, in accordance with the Bid Documents, will also be received by Blue Ridge Regional Airport **prior to 2:00pm, July 2nd, 2026** for furnishing the services described herein and then opened in public. The time a bid is received shall be determined by the time so stated in eVA when electronic bids are **uploaded and submitted**, or the time stamped received by the time clock located in the Airport. Bids received after the above time and date shall not be considered.

The public bid opening will be performed at the project site. Bids will be opened and read aloud at the time of the opening. A bid tabulation will be made available on eVA as well as via email if requested.

Bidders using a certified check, cashier's check or cash escrow as your **Bid Bond**, a physical copy of your bid will need to be submitted by the posted due date and time to be considered for award. If your bond is in a form other than those mentioned, an electronic version of the document is acceptable; you should submit the electronic version **and** send the original to the Airport. **The original must be postmarked on or before the due date.**

Bids must be submitted prior to the date and time stated above. For the purpose of original Bid Bond submittals, and Bidders who are unable to submit a Bid electronically, documents are to be delivered to:

BY MAIL OR BY EXPRESS COURIER OR HAND DELIVERY:

Blue Ridge Regional Airport
525 Airport Road
Martinsville, Virginia 24112

The project is generally described as: Provide all materials, labor, equipment, and other incidentals necessary for the construction of a new BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING. Work will include construction of a building, approximately 7,800 gross square feet in area, associated site work, exterior site lighting and utilities work. The contractor will be provided a laydown area, however the location as shown on the plans may change due ongoing site work. This project will be grant funded by the Virginia Department of Aviation. This grant funding will require separation in bid items as noted on the bid form. This is for the purposes of allocation grant funds by fund type. The subsequent schedule of values will also require structuring to conform to grant funding. Coordination and testing will be required as noted in the Contract Documents. All Work shall be as described in the Project Manual and shown on the Contract Drawings.

An optional virtual (**Microsoft Teams**) pre-bid conference will be held at **10:00 a.m., June 2nd, 2026. Registration is required to participate.** Contact Thomas Freeman, PSH+, by email: tfreeman@pshplus.com or phone (804) 823-2900 at least **24 hours in advance** of the meeting to register. Registered participants will receive an email calendar invite with all associated

meeting credentials. Immediately following the meeting site visits will be allowed **by appointment only**, contact Jason Davis (Blue Ridge Regional Airport) by phone 276-957-2291 for scheduling.

The purpose of the pre-bid conference is to allow potential Bidders an opportunity to present questions and obtain clarification relative to any facet of this solicitation. While attendance at this conference will not be a prerequisite to submitting a bid, Bidders who intend to submit a bid are encouraged to attend. All questions about the meaning or intent of the Bid Documents or Contract Documents shall be submitted to the ARCHITECT in writing. In order to receive consideration, all questions must be received by the ARCHITECT prior to **3:00 P.M., June 25, 2026**. Any changes made to the written requirements of the Bid Documents shall be made by written Addendum only.

Bid Documents consisting of the Contract Drawings and Project Manual, in Adobe.pdf format, are available beginning **May 26, 2026** at no cost to Bidders. Airport solicitations are advertised through the eVA website.

Bidders will utilize the “search engine” to locate the solicitation by (*Title, Solicitation Number, etc.*). Special software may be required to download and/or view the document(s).

In order for the ARCHITECT to maintain an accurate list of plan holders, Bidders should register as a plan holder with the ARCHITECT once obtaining them from eVA by sending an email to Thomas Freeman: tfreeman@pshplus.com, and include the following: (**IFB-52626 BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING**; *Company Name; Contact Name; Email Address; Physical Address; Mailing Address, if different; Telephone, Cellular, and Fax Numbers*).

Addenda to the project, if any, will be posted to the solicitation on eVA. Bidders are responsible for visiting the website to determine whether addenda were issued prior to submitting a bid for this project. All Addenda, if any, shall be acknowledged in the designated location on the Bid Form.

The OWNER and ARCHITECT making copies of the Bid Documents available does so for the purpose of obtaining Bids on Work and does not confer a license or grant of any other use. The OWNER and ARCHITECT does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete Bid Documents. The Bid Documents shall be used in preparing bid responses.

The Airport reserves the right to waive Bid informalities, reject any and all Bids, request rebidding, or to award a contract as it deems will best serve its interest.

Refer to the Instructions to Bidders for bidding procedures and requirements.

This Bid invitation, and award to the successful Bidder, shall be conducted in accordance with the Code of Virginia, and Bidder's shall be subject to the provisions thereof.

In the event there is a conflict between the provisions stated herein, the more stringent provisions shall take precedence.

Any questions relating to the Bidding Documents shall be directed in writing to: Thomas Freeman ARCHITECT. Email: tfreeman@pshplus.com

BLUE RIDGE REGIONAL AIRPORT (OWNER)
ISSUED BY: Jason Davis – Managing Director

Email: jdavis@flyblueridge.com
525 Airport Road
Martinsville, VA 24112
Telephone: 276-957-2291

END OF INVITATION FOR BID

SECTION 00 21 13 – INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 SEE AIA A701, INSTRUCTIONS TO BIDDERS FOLLOWING THIS DOCUMENT.

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	00 21 13 - 1	Instructions to Bidders

DRAFT AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project
(Name, location, and detailed description)

«Blue Ridge Regional Airport Terminal
«Martinsville, VA»
«General Aviation Terminal Building, approximately 7,800 SF»

THE OWNER:

(Name, legal status, address, and other information)

«Blue Ridge Regional Airport»
«525 Airport Road »
«Martinsville, Virginia 24112 »
«Phone: 276-957-2291 »

THE ARCHITECT:

(Name, legal status, address, and other information)

«Price Studios, LLC »«dba PSH+ »
«1700 Willow Lawn Drive, Suite 200 »
«Richmond, VA 23230 »
«Phone: 804-823-2900 »

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- 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™-2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents, but are subject to and governed by definitions under applicable laws and regulations.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid in conformance with the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

§ 1.10 A Responsible Bidder means a person or entity that has the capability, in all respects, to perform fully the Contract requirements and the moral and business integrity and reliability that will ensure good faith performance and complies with all of the Qualifications.

§ 1.11 A Responsive Bidder means a person or entity that has submitted a Bid which conforms in all material respects to the Invitation for Bid and requirements of the Bidding Documents and complies with all of the Qualifications.

§ 1.12 An Informality means a minor defect or variation of a Bid from the exact requirements of the Invitation to Bid and of the Bidding Documents which does not affect the price, quality, quantity of delivery schedule for the goods, services or construction being procured.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 The Bidder has read and understands the Bidding Documents to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.
- .2 the Bidder is made in compliance with the Bidding Documents;
- .3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.
- .4 The Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception

- .5 The Bidder has carefully reviewed the Bidding Documents and has verified that all of the Bidding Documents received are complete. The Bidder shall notify the Architect immediately if received Bidding Documents are not complete.
- .6 the Bidder has familiarized itself with all applicable federal, state and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work; the Bidder is licensed or certified to perform the Work.
- .7 the Bidder shall pay all county, city, state and federal taxes required by laws in effect at the time the Bids are received and resulting from the Work or traceable thereto. Said taxes shall not be in addition to the Contract price between the Owner and

the Bidder, as the taxes shall be an obligation of the Bidder and not of the Owner and the Owner shall be held harmless and indemnified for the same by the Bidder.

8. *The failure or omission of any Bidder to receive or examine any form, instrument, addendum or other documents or to acquaint itself with conditions existing at the site(s) shall in no way relieve any Bidder from any obligations with respect to its Bid or to the Contract.*

§ 2.2 Bidder's Representations

§ 2.2.1 Bidder's must inform themselves fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so shall not relieve the successful Bidder of its obligation to furnish all material and labor necessary to carry out the provisions of the Contract for the Bid amount.

§ 2.2.2 By submitting Bids, Bidders shall be presumed to have inspected the site and to be thoroughly familiar with the Drawings, Project Manual, Specifications and other Contract Documents (including all addenda). The failure of any Bidder to examine any instrument or document shall not relieve that Bidder from any obligation with respect to Bid or Contract.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

§ 3.1.1 Bidders shall obtain complete Bidding Documents from the issuing office designated in the Invitation for Bid.

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§ 3.1.2 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.3 Every Bidder is responsible to review all Bidding Documents received to verify that each set contains a complete set of Contract Documents. Any incomplete Bidding Documents shall be immediately returned to the Architect.

§ 3.1.3.1 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect as indicated in the Invitation for Bid prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 SUBSTITUTIONS

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2

No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect and the request is accompanied by a fully completed Pre-Bid Substitution Request form at least ten days prior to the date for receipt of Bids.

Submit substitution request by completing CSI/CSC Form 1.5C – Substitution Request (During Bidding /Negotiating Stage). See this form for additional information and instructions. Use on this form; other forms of submission are unacceptable.

Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final unless objected to by Owner.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.3.5 The Bidder agrees that its Bid shall be based on products and work indicated in the Bidding Documents. The Contractor assumes all risks using a price or bid proposal representing a product or work that is not indicated in the Bidding Documents and, if the Contractor elects to use that product or work he shall submit it in accordance with the Division I requirements and as stated herein. If that product or work is rejected, the Bidder shall provide a product or work indicated in the Bidding Documents as its cost. The Architect and the Owner shall not consider any requests for additional payments to provide the work as required by the Contract

Documents.

§ 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents. Copies of the Addendum will be posted electronically to eVA

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids

§ 3.4.3.1 Depending on the nature of an Addendum (clarifications, limited scope of revisions, added manufacturers) issued less than four days prior to receipt date, the Architect, in its professional judgement, reserves the right to issue said Addendum without postponement of the bid date. However, if in the professional judgement of the Architect, the information is contained in the Addendum would be such that it would be unfair or unreasonable to prepare a bid proposal based on the revisions of the Addendum, then the bid date will be postponed to allow distribution of the Addendum and time to prepare a bid proposal.

§ 3.4.4 Each Bidder shall ascertain, prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Where so indicated by the Bid form, all amounts shall be expressed in figures only.

§ 4.1.4 All changes made by the Bidder to the bid form or outside of the envelope shall be signed or initialed by the Bidder. Bids containing any conditions, omissions, erasures, alterations, or items not called for in the Bid, may be rejected by the Owner as being incomplete or nonresponsive.

§ 4.1.5 All requested Alternates shall be bid. If the Bidder does not desire to bid on an Alternate, enter "No Bid". If the Owner elects to accept an Alternate, all Bidders submitting a "No Bid" for the Alternate selected by the Owner shall be ruled nonresponsive and their Bid shall not be considered in the award of the Contract. If no change in the Base Bid is required, enter "No Change."

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 BID SECURITY

§ 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required.

The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

§ 4.2.2 A surety bond is required and it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected.

§ 4.2.4 Each Bid must be accompanied by surety in the amount of 5% of the Bid in the form of cash, certified check or Bid Bond. Bid Bonds shall be in the form in the Bid Documents, or in such other form as may be acceptable to the Owner duly executed by the Bidder as principal and with corporate surety from a company approved by the Owner. Surety shall be returned to Bidders promptly after the Owner and the successful Bidder have executed the

Contract, or, if no award has been made within 90 days after the date of Bid opening, upon demand of any bidder whose Bid has not been accepted at any time thereafter.

§ 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, or other courier, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.1.1 The Bidder shall place on the outside of the envelope containing its Bid a notation providing the Contractor License Number and the Class of License held by the Contractor.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids shall be returned unopened.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 Oral, telephonic, telegraphic, facsimile, or other electronically transmitted bids will not be considered.

§ 4.3.5 In the solicitation or awarding of Contracts, the Owner shall not discriminate because of the race, religion, color, sex, age, disability or national origin of the Bidder. The Owner welcomes and encourages the participation of small businesses and businesses owned by women and minorities in procurement transactions made by the Owner.

§ 4.3.6 Trade secrets or proprietary information submitted by a Bidder in connection with a procurement transaction, shall not be subject to public disclosure under the Virginia Freedom of Information Act; however, the Bidder must invoke the applicable protection, prior to or upon submission of the data or other materials, and must identify the data or other materials to be protected and state the reasons why protection is necessary. The Owner will not accept responses to the Invitation to Bid in cases where the Bidder declares the entire response to the Invitation to Bid to be proprietary information. The Bidder must designate, in the smallest increments possible, that part of the Bid which is deemed to be proprietary.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 MODIFICATION OF BID

§ 4.4.1.1 A Bid may be modified by the Bidder any time prior to the time and date set for the receipt of Bids. The Bidder shall give the Purchasing Division written notice of its intentions at the time of the request to modify the Bid as given.

§ 4.4.1.2 Modified Bids may be resubmitted up to the date and time set for the receipt of Bids.

§ 4.4.1.3 Oral, telephonic, telegraphic, facsimile, or other electronically transmitted modifications of Bids shall not be accepted.

§ 4.4.2 WITHDRAWAL OF BIDS

§ 4.4.2.1 Upon proper request and identification, Bids may be withdrawn at any time prior to the date and time set for the receipt of Bids.

§ 4.4.2.2 The Bidder shall not be allowed to withdraw its Bid within 90 consecutive calendar days after the Bid opening date and time except as provided for in the following paragraph.

§ 4.4.2.3 Bids may be withdrawn, if the reason for withdrawal is due to error in accordance with Section 2.2-4330A of the Code of Virginia. Under these procedures, the mistake shall be proved only from the original work papers, documents and materials delivered as required. The work papers, documents and materials submitted by the Bidder, shall at the Bidder's request, be considered trade secrets or proprietary information subject to *conditions of subsection F of Section 2.2-4342 of the Code of Virginia.*

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

All Bids received on time in accordance with the requirements stated herein shall be opened and publicly read aloud after the posted closing time. Any Bidder, upon request, shall be afforded the opportunity to inspect Bid records within a reasonable time after the opening of all Bids but prior to award, except in the event that the public body decides not to accept any of the Bids and to reopen the Contract. Otherwise, Bid records shall be open to public inspection only after award of the Contract. Any inspection of procurement transaction records shall be subject to reasonable restrictions to ensure the security and integrity of the records.

§ 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or not in conformance with requirements of the Bidding documents is subject to rejection.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.1.1 In determining the lowest responsible Bidder, the Owner may consider, among other things, the Bidder's past performance, conduct on other contracts, and other information provided by the Bidder, including the Bidder's Qualification Package, if requested.

§ 5.3.2 The Owner shall have the right to accept as many Alternates in order as the Owner in its discretion decides to award, and to determine the low Bidder on the basis of the sum of the Base Bid plus the Alternates the Owner decides to award.

§ 5.3.3 In case of a tie Bid, preference may be given to goods, services and construction produced in the County of Henry or State of Virginia or provided by persons, firms or corporations having principal places of business in County of Henry or State of Virginia, if such a choice is available; otherwise the tie shall be decided by lot.

§ 5.3.4 If a Contract is to be awarded, the Owner will give the Bidder a Notice of Award within ninety (90) calendar days after the day of the Bid opening.

§ 5.4 NEGOTIATION WITH LOWEST RESPONSIVE AND RESPONSIBLE BIDDER

§ 5.4.1 If award of a Contract to the lowest responsive and responsible Bidder is precluded because of limitations on available funds, the Owner reserves the right to negotiate the Bid amount with the lowest responsive, responsible Bidder to obtain a Contract amount within the available funds. The negotiations may involve changes in either the features or scope of the Work. Such negotiations may include reducing the quantity, quality or other cost saving mechanisms involving items in the Bid amount, including unit prices (if any) and/or allowances (if any) that affect the Bid amount and/or Alternates (if any).

§ 5.4.2 The Owner shall notify the lowest responsive and responsible Bidder that such a situation exists and the Owner and Bidder shall then conduct their negotiations in person by mail, by telephone or by any means they find convenient.

§ 5.4.3 If an acceptable Contract can be negotiated, the changes to the Bid amount and Bidding Documents agreed upon in the negotiations shall be summarized in a "Post Bid Addendum," and included in the Contract.

§ 5.4.4 If the Owner and the lowest responsive and responsible Bidder cannot negotiate a Contract within available funds, the Owner shall terminate negotiations and reject all bids.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.1.1 Within 72 hours after the County's request, the apparent low Bidder shall submit a properly completed Contractor's Qualification Statement, AIA Document A305, to the County's Architect for the Project.

§ 6.1.1.1 **QUALIFICATIONS:** To be considered for an award of a contract on this Project, Bidders shall:

- a. Have been the Prime Contractor for a minimum of three (3) projects of similar scope and value within the last ten (10) years with one (1) project having been completed within the last five (5) years, and successfully completed those projects on time, within budget and in accordance with applicable codes, standards, rules and regulations;
- b. Be a legally licensed Class A contractor in the State of Virginia with no revocation within the past five (5) years;
- c. Have been in business under the present company name for a minimum of five (5) years and shall not have been declared in default on any construction contract within that time;
- d. Have demonstrated organizational capability including capacity to undertake the Project, record keeping abilities, experience, qualifications and stability of staff involved in the Project;
- e. Have prior experience with the installation of complex audio, surveillance and security systems similar in scope with this contract;
- f. Be bondable to 100% of the Contract sum for both performance and payment;
- g. Have demonstrated experience successfully working with local governments on similar projects;
- h. Have demonstrated successful project experience with proposed subcontractors, subject to subcontractor requirements of this Project;
- i. Have demonstrated financial capacity to fulfill project requirements;
- j. Have a project manager and site superintendent who have held similar positions for a project or projects of similar scope and value within the last five (5) years and that will be assigned to this Project in the same positions;
- k. Have demonstrated abilities to manage a schedule and complete punch list in an expeditious manner;
- l. Have no defaults on work done under a government contract;
- m. Have not been formally debarred or suspended from entering into contracts with any governmental agency or other notification or ineligibility for or prohibition against bidding or proposing on government contracts;
- n. Not have been denied a contract based on any obligation to, or unsatisfied judgement or lien held by a governmental agency

§ 6.1.1.2 After bids are received, Bidders whose bids are under consideration shall be asked to submit their qualifications packages. Within ten (10) calendar days of the request, Bidders shall submit to the Owner a fully completed AIA A305 Contractor's Qualification Statement and shall attach evidence that clearly demonstrates that the Bidder meets each of the criteria listed in 6.1.1.1. The information provided as evidence shall be provided in same order and shall follow the same format listed in 6.1.1.1.

§ 6.1.2 Qualifications of Bidder: The Owner may make such investigation as it deems necessary to determine the ability of any Bidder to perform the Work. Bidders shall furnish to the Owner all such information and data for this purpose as the Owner requests. The owner reserves the right to reject any Bid if the evidence indicates that such Bidder is not properly qualified to carry out the obligations of the Contract and to complete the Work.

§ 6.1.3 Conditional Bids shall not be accepted.

§ 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, within 15 days after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- 1 a designation of the Work to be performed with the Bidder's own forces;
- 2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and

- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution, provided such adjustment in cost is justifiable and reasonable. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

§ 6.4 ESCROW ACCOUNT FOR RETAINED FUNDS

§ 6.4.1 At the time the Bid is submitted, provided the Bid price exceeds \$200,000.00 (including additive alternates, if any) and subject to the provisions of Section 2.2-4334 of the Virginia Public Procurement Act, the Bidder shall have the option to request use of an escrow account procedure for utilization of funds retained by the Owner and may request use of this option by so indicating in the space provided on the Bid Form. In the event the Owner's award to the Contractor exceeds \$200,000.00 and the Contractor has indicated on the Bid form its intention to use the escrow procedure, the Contractor may use the escrow account procedure. The "Escrow Agreement" form included in this Bid proposal shall be executed by the Contractor and submitted to the Purchasing Division Director within 15 calendar days of notification by the Owner that its Bid has been accepted. If the "Escrow Agreement" is not submitted as herein provided, the Contractor shall forfeit such rights to the use of the escrow account procedure.

§ 6.4.2 In order to have retained funds paid to an escrow agent, the Contractor, the escrow agent and the surety shall execute an Escrow Agreement form and submit same to the Owner for approval. The Contractor's escrow agent shall be a trust company, bank or savings and loan institution with its principal office located in the Commonwealth of Virginia. The Escrow Agreement form shall contain the complete address of the escrow agent and surety and an executed escrow agreement shall be authority for the County Administrator, or his designee, to make payment of retained funds to the escrow agent. After approving the Escrow Agreement, the Owner shall pay to the escrow agreement the funds retained as provided herein except that funds retained for lack of progress or other deficiencies on the part of the Contractor shall not be paid to the escrow agent.

§ 6.4.3 The escrow agent may, in accordance with stipulations contained in the escrow agreement, invest the funds paid into the escrow account and pay earnings on such investments to the Contractor or release the funds to the Contractor provided such funds are fully secured by approved securities.

§ 6.4.4 Retained funds invested and securities held as collateral for retaining may be released only as and when directed by the County Administrator, or his designee. When the final estimate is released for voucher, the Owner shall direct the escrow agent to settle the escrow account by paying the Contractor or the Owner monies due them as determined by the County Administrator or his designee. The Owner reserves the right to recall retained funds and to release same to the surety upon receipt of written requests from the Contractor or in the event of default.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 The Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

§ 7.2.1 The successful Bidder shall deliver the required bonds along with the required Certificate of Insurance to the Owner within fifteen (15) days after the Notice of Award of the Contract.

§ 7.2.2 The bonds shall be written on AIA Document A312, Performance Bond and Payment Bond, as modified by the Owner. Each bond shall be written for the full amount of the Contract. Both bonds shall be written in the amount of the Contract Sum.

§ 7.2.3 The bonds shall be dated on the date of the Contract (Agreement).

§ 7.2.4 The successful Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety or insurance company to affix to the bond a certified and current copy of the power of attorney.

§ 7.3 Simultaneously with delivery of the executed Contract, the Contractor shall furnish surety bonds in the amount of 100% of the Contract Price, as security for faithful performance of the Contract and for the payment of all persons performing labor on the project or furnishing materials in connection with the Contract. A duly authorized surety company satisfactory to the Owner shall provide security for such bonds. Bonds provided shall be a Performance Bond and Payment Bond, AIA Document A312. Bonds shall comply with the Code of Virginia, and each bond shall be in an amount equal to one hundred percent (100%) of the accepted bid as guaranty for the faithful performance of the contract and the payment of all persons who have and fulfill contracts which are directly with the successful Bidder. Sureties shall be companies licensed to do business in the Commonwealth of Virginia with a resident Virginia agent. Documents evidencing current authority of attorney-in-fact of surety must be attached to the bonds.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

§ 8.1 Unless otherwise required in the Bidding Documents, the Agreement for the Work shall be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

§ 8.2 The Owner and the Contractor recognize that time is of the essence and that the Owner will suffer financial loss if the Work is not completed by the Substantial Completion date required by the Contract Documents. Both parties recognize the delays, expense and damages involved in proving in a legal proceeding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, the Owner and the Contractor agree, stipulate and fix as liquidated damages if delayed, but not as a penalty, that the Contractor together with the Contractor's surety shall pay to the Owner the amount set forth in the Project Manual for each calendar day or part thereof that expires after the date indicated for the Substantial Completion of the Work.

ARTICLE 9 BID DOCUMENTS

§ 9.1 Bid Requirements

§ 9.1.1 Bidders must use the Bid Form contained within these specifications. The Bid Form is part of the Contract Documents

§ 9.1.2 Every bidder shall submit an original Bid Form with the Bidder's authorized signature.

§ 9.2 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

§ 9.2.1 Drawings

BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING

Drawing Set dated May 21, 2026

T0.01 – TITLE SHEET
AC.01 – LIFE SAFETY PLAN
AF.01 – FUNDING PLAN
AR.01 - ARCH RENDERINGS – EXTERIOR
AR.02 - ARCH RENDERINGS – INTERIOR
A0.10 - BUILDING ENVELOPE SYSTEMS
A0.11 - INTERIOR PARTITION TYPES
A0.30 - GENERAL ACCESSORY ACCESSIBILITY STANDARDS
A0.41 - ACCESSIBILITY STANDARDS
A1.00 – SITE PLAN
A1.10 - LVL-01 FLOOR PLAN AND NOTES
A1.11 - LVL-01 DIMENSION PLAN AND NOTES
A1.20 - LVL-02 ATTIC PLAN & NOTES
A1.21 - LVL-02 DIMENSION PLAN AND NOTES
A1.30 - ROOF PLAN AND NOTES
A1.40 - LVL-01 REFLECTED CEILING PLAN
A1.41 - LVL-01 REFLECTED CEILING PLAN - HIGH ROOF AREA
A1.50 - PRECAST PLAN & SPECIAL SHAPES
A2.01 - EXTERIOR ELEVATIONS
A2.02 - EXTERIOR ELEVATIONS
A2.10 - GLAZING ELEVATIONS - EXTERIOR
A2.11 - GLAZING ELEVATIONS – INTERIOR
A3.01 - BUILDING SECTIONS
A3.02 - BUILDING SECTIONS
A3.10 – WALL SECTIONS
A3.11 – WALL SECTIONS
A3.12 – WALL SECTIONS
A3.13 – WALL SECTIONS
A3.14 – WALL SECTIONS
A3.15 – WALL SECTIONS
A3.16 – WALL SECTIONS
A3.20 – SECTION DETAILS
A3.21 – SECTION DETAILS
A3.22 – SECTION DETAILS
A3.23 – SECTION DETAILS
A3.24 – SECTION DETAILS
A3.25 – SECTION DETAILS
A3.26 – SECTION DETAILS
A3.30 – PLAN DETAILS
A3.31 – PLAN DETAILS
A3.32 – PLAN DETAILS
A3.33 – PLAN DETAILS
A3.34 – PLAN DETAILS
A3.35 – PLAN DETAILS
A4.10 - ENLARGED PLANS & INTERIOR ELEVATIONS
A4.20 - INTERIOR ELEVATIONS
A4.21 - INTERIOR ELEVATIONS
A4.40 - ENLARGED CEILING PLANS & RCP DETAILS
A5.10 - CASEWORK STANDARD DETAILS
A5.11 - CASEWORK & MILLWORK DETAILS
A5.12 - CASEWORK DETAILS
A6.10 - DOOR SCHEDULE AND TYP DETAILS
A7.01 - LVL-01 FINISH PLAN AND NOTES
A7.20 - FINISH LEGEND
S001 - GENERAL STRUCTURAL NOTES
S002 - GENERAL STRUCTURAL NOTES
S101 - FOUNDATION PLAN
S102 - ATTIC FRAMING PLAN
S103 - LOW ROOF FRAMING PLAN
S104 - HIGH ROOF FRAMING PLAN
S201 - TYPICAL FOUNDATION DETAILS
S202 - TYPICAL FOUNDATION DETAILS
S203 - TYPICAL SLAB-ON-GROUND DETAILS
S204 - FOUNDATION SECTIONS AND DETAILS
S301 - TYPICAL STEEL FRAMING DETAILS
S302 - TYPICAL STEEL JOIST FRAMING DETAILS
S303 - TYPICAL STEEL DECKING DETAILS
S304 - JOIST FRAMING SECTIONS
S305 - STEEL TRUSS ELEVATION

S306 - STEEL FRAMING SECTIONS
 S307 - STEEL FRAMING SECTIONS
 S401 - BRACED FRAME ELEVATIONS
 S501 - TYPICAL COLD FORMED STEEL DETAILS
 S502 - TYPICAL COLD FORMED STEEL DETAILS
 S601 - STEEL STRAP BRACING DETAILS
 M0.01 - MECHANICAL - LEGEND, NOTES & SHEET INDEX
 M1.01 - MECHANICAL - DUCT WORK PLAN
 M3.01 - MECHANICAL - ENLARGED PLANS
 M3.02 - MECHANICAL - SECTIONS
 M3.03 - MECHANICAL - ISOMETRIC
 M6.01 - MECHANICAL - SCHEDULES
 E0.01 - ELECTRICAL - LEGEND, SCHEDULES & DETAILS
 E1.01 - ELECTRICAL - LIGHTING PLAN
 E2.01 - ELECTRICAL - POWER PLAN
 E2.02 - ELECTRICAL - ENLARGED KITCHEN PLAN
 E3.01 - ELECTRICAL - RISER & SCHEDULES
 E4.01 - ELECTRICAL - SITE PLAN
 P0.01 - PLUMBING - LEGEND, NOTES & SCHEDULES
 P1.01 - PLUMBING - SWV PLAN
 P2.01 - PLUMBING - DOMESTIC WATER PLAN & GAS RISER DIAGRAM
 P3.01 - PLUMBING - ENLARGED PLANS KITCHEN & MECH RM
 P3.02 - PLUMBING - ENLARGED PLANS PUBLIC RESTROOMS
 P4.01 - PLUMBING - DETAILS
 P5.01 - PLUMBING - SWV RISERS
 P5.02 - PLUMBING - DOMESTIC WATER RISER
 K1.00 - GENERAL NOTES
 K2.00 - EQUIPMENT PLAN
 K3.00 - ELECTRIC PLAN
 K4.00 - GAS AND PLUMBING LAYOUT
 K5.00 - WASTE LAYOUT
 K6.00 - BLOCKING LAYOUT
 K7.00 - HOOD DETAILS
 K7.10 - HOOD DETAILS
 K7.20 - HOOD DETAILS

§ 9.2.2 Specifications:

Project Manual

BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING
 Project Manual dated May 21, 2026

Volume 1 – Procurement & Contracting
 Volume 2 – Specifications
 Volume 3 - Appendix

SECTION 00 21 50 – PREBID QUESTION FORM

SUMMARY

1.01 SEE THE FOLLOWING PREBID QUESTION FORM FOLLOWING THIS PAGE.

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	00 21 50 - 1	Prebid Question Form

PREBID QUESTION FORM

Only questions requiring a modification or interpretation to the Bidding Documents by an addition, deletion, clarification, or correction, will be made by written Addendum, and transmitted as indicated in the Instructions to Bidders. **Questions that do not require a modification or interpretation to the Bidding Documents will not be responded to and will not be included in an Addendum.**

The ARCHITECT and OWNER shall not be responsible for oral modifications and interpretations. Bidders and Sub-bidders requesting a modification or interpretation by addition, deletion, clarification, or correction of the Bidding Documents shall complete and submit this form which shall reach the ARCHITECT prior to **3:00 p.m., June 25, 2026**. Use a separate form for each question submitted.

DATE: _____

The following question concerns Drawing (number) _____:

The following question concerns Specifications Section (number) _____, page _____, paragraph _____:

Questions submitted by:

Name _____

Organization _____

Telephone No. (_____) e-mail Address: _____

Mail Form to:

PSH+ Attn: Thomas Freeman

1700 Willow Lawn Drive, Suite 200

Richmond, Virginia 23230

email PDF version of Form to: tfreeman@pshplus.com

END PREBID QUESTION FORM

SECTION 00 40 00 - PROCUREMENT 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 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the procurement requirements.
- B. Instructions to Bidders: AIA A701.
- C. Bid Form: Section 00 41 00 - Bid Form.
- D. Procurement Form Supplements:
 - 1. Bid Bond: AIA A310-2010
 - 2. Payment Bond: AIA A312-2010
 - 3. Performance Bond: AIA A312-2010

1.03 REFERENCE STANDARDS

- A. AIA A310 - Bid Bond; 2010.
- B. AIA A312-2010 – Payment Bond
- C. AIA A312-2010 – Performance Bond
- D. AIA A701 – Instructions to Bidders

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

DRAFT AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

« Blue Ridge Regional Airport »
« 525 Airport Road »
« Martinsville, VA 24112 »
« Phone: 276-957-2291 »

BOND AMOUNT: \$ « »

PROJECT:

(Name, location or address, and Project number, if any)

« Blue Ridge Regional Airport Terminal Building »
« 525 Airport Road »
« Martinsville, VA 24112 »

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

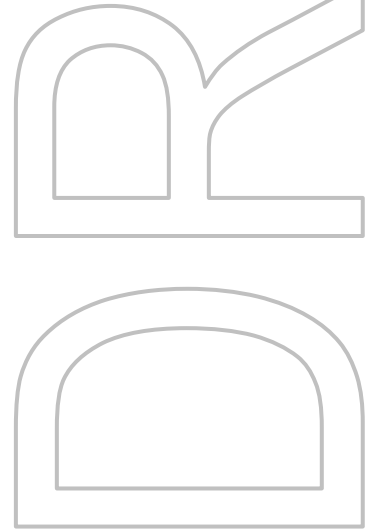
If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.



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Signed and sealed this « » day of « », « »

« »
(Witness)

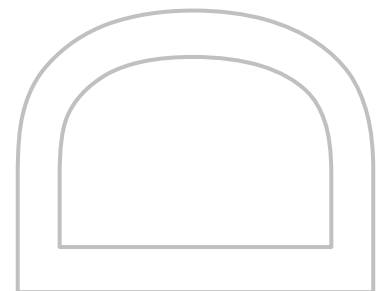
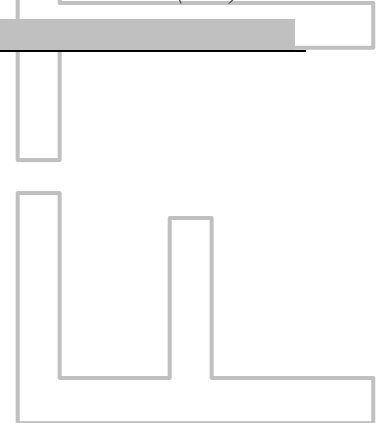
« »
(Witness)

« »
(Contractor as Principal) (Seal)

« »
(Title)

« »
(Surety) (Seal)

« »
(Title)



DRAFT AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

«Blue Ridge Regional Airport»
«525 Airport Road »
«Martinsville, VA 24112 »
«Phone: 276-957-2291»

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

«Blue Ridge Regional Airport Terminal Building»
«525 Airport Road »
«Martinsville, VA 24112»

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond: « » None « » See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature: « »

SURETY

Company: (Corporate Seal)

Signature: « »

Name and « »
Title:

(Any additional signatures appear on the last page of this Payment Bond.)

Name and « »
Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE: (Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.



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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)
Signature: « »

Name and Title: « »
Address: « »

SURETY

Company: _____ (Corporate Seal)
Signature: « »

Name and Title: « »
Address: « »

DRAFT AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

«Blue Ridge Regional Airport »
«525 Airport Road »
« Martinsville, VA 24112»
«Phone: 276-957-2291»

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

«Blue Ridge Regional Airport Terminal Building»
«525 Airport Road »
« Martinsville, VA 24112»

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this « » None « » See Section 16

Bond:

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature: « »

Name and « »

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

SURETY

Company: (Corporate Seal)

Signature: « »

Name and « »

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

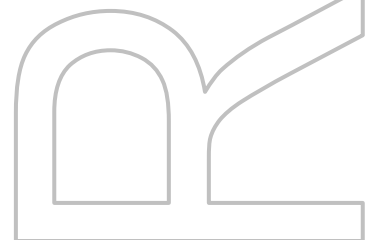
(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.



ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the

Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner, or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: « »

Name and Title: « »« »

Address: « »

SURETY

Company: _____ (Corporate Seal)

Signature: « »

Name and Title: « »« »

Address: « »

SECTION 00 41 00 – BID FORM

SUMMARY

1.01 SEE THE FOLLOWING OWNER PROVIDED BID FORM

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	00 41 00 - 1	Bid Form

BID FORM

**INVITATION FOR BID NUMBER: IFB-52626
BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING
MARTINSVILLE, VIRGINIA**

SUBMISSION OF BIDS

Responses to this solicitation will be accepted electronically through eVA (Virginia's e-Procurement Market Place) as well as via mail or in-person @ the airport. Guidance on how to submit a bid electronically is available on eVA's website, go to <https://eva.virginia.gov/eva-vendor-training.html> and select the **"Respond to IFBs-RFPs and more"** PDF located under the heading **"Find and Response to Virginia Business Opportunities (VBO)"**. Contact eVA Customer Care at (866) 289-7367 if you have questions or need assistance.

Bids must be submitted by 2pm on July 2nd, 2026. For the purpose of original Bid Bond submittals, and Bidders who are unable to submit a Bid electronically, documents are to be delivered to:

BY MAIL OR BY EXPRESS COURIER OR HAND DELIVERY:

Blue Ridge Regional Airport Terminal
525 Airport Road
Martinsville, Virginia 24112

FROM: _____
Legal Name of Bidder (Company)

Bidder's Address:

Bidder's Address:

FOR: BLUE RIDGE REGIONAL AIRPORT TERMINAL BUILDING

Having carefully examined the site, and all of the Bidding and Contract Documents, and in compliance with the "Invitation for Bid," and "Instructions to Bidders," the undersigned proposes to provide all labor, materials, supplies, equipment, services, transportation, and perform all Work necessary for the construction of this Project in accordance with the Bid Documents, dated May 21st, 2026, prepared by PSH+ ARCHITECTS.

Complete this Bid Form in blue or black ink or by typewriter. Discrepancies in the multiplications of units of work and the unit prices will be resolved in favor of the correct multiplication of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

The bid for this project will be a single Lump Sum Bid Items as described below:

TERMINAL BUILDING AND ADJACENT SITE IMPROVEMENTS:

Lump sum price for all Work associated with the construction of the Terminal Building and site improvements indicated in the bid documents. Site improvements to include all earthwork and grading, drainage and storm sewer connections, sidewalks, and courtyards adjacent to the building, erosion and sediment control, and landscaping. All work to be performed in strict accordance with the Bid Documents for this Project, for the Lump Sum of:

TOTAL BASE BID PRICE

\$ _____
Dollars.

(Write in Words)

\$ _____
Dollars.

(Figures only)

AWARD OF BID

Award will be based on the TOTAL BASE BID PRICE entered on the Bid Form.

RECEIPT OF ADDENDA:

Receipt of Addenda listed below is acknowledged and the bid incorporates all requirements of these Addenda:

No. _____	Date _____	No. _____	Date _____
. _____	: _____	. _____	: _____
No. _____	Date _____	No. _____	Date _____
. _____	: _____	. _____	: _____
No. _____	Date _____	No. _____	Date _____
. _____	: _____	. _____	: _____
No. _____	Date _____	No. _____	Date _____
. _____	: _____	. _____	: _____

TIME OF COMPLETION

Based on a Bid Receipt date of July 2nd, 2025, the Owner anticipates that the Contract will be executed by approximately mid-September 2026 and that the Notice to Proceed date will be approximately mid-October 2026. The undersigned understands that time is of the essence and agrees that Work included in this Contract shall achieve Substantial Completion no later than 396 calendar days from the Notice to Proceed date and shall achieve Final Completion no later than thirty (30) calendar days thereafter.

LIQUIDATED DAMAGES

The undersigned agrees, stipulates and fixes as liquidated damages if delayed, but not as a penalty, the sum of five hundred dollars (**\$500**) per calendar day that the undersigned together with the undersigned's surety shall pay the Owner for each calendar day or part thereof that expires after the date specified for the Substantial Completion of the Work and until the Work is Substantially Complete. The undersigned also agrees, stipulates and fixes as liquidated damages if delayed, but not as a penalty, the sum of two hundred fifty dollars (**\$250**) per calendar day that the undersigned together with the undersigned's surety shall pay the Owner for each calendar day or part thereof that expires after the date specified for the Final completion of the Work and until the Work achieves Final Completion. By bidding, the undersigned hereby agrees to be responsible for such liquidated damages.

CONTRACTOR REGISTRATION

If a contract for construction, removal, repair or improvement of a building or other real property is for one hundred and twenty thousand dollars (\$120,000) or more, or if the total value of all such contracts undertaken by Bidder within any 12-month period is seven hundred and fifty thousand dollars (\$750,000) or more, the Bidder is required under Title 54.1-1100, *Code of Virginia* (1950), as amended, to be licensed by the State Board of Contractors as a "CLASS A CONTRACTOR." The board shall require a master tradesmen license as a condition of licensure for electrical, plumbing and heating, ventilation and air

conditioning Contractors. The Bidder shall place on the outside of the envelope containing the bid and shall place in the bid over his signature his Contractor license number:

Licensed Class A Virginia Contractor No. _____ Specialty _____

If the Bidder shall fail to provide this information on his bid or on the envelope containing the bid and shall fail to promptly provide said Contractor license number to the County in writing when requested to do so before or after the opening of bids, he shall be deemed to be in violation of § 54.1-1115 of the *Code of Virginia* (1950), as amended, and his bid will not be considered. If a Bidder shall fail to obtain the required license prior to submission of his bid, the bid shall not be considered.

STATE CORPORATION COMMISSION IDENTIFICATION NUMBER

In accordance with *Code of Virginia* § 2.2-4311.2 subsection B, a Bidder organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 is required to include in its bid the identification number issued to it by the State Corporation Commission (SCC). Any Bidder that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law shall include in its bid a statement describing why the Bidder is not required to be so authorized. Indicate the above information on the SCC Form provided. Contractor agrees that the process by which compliance with Titles 13.1 and 50 is checked during the solicitation stage (including without limitation the SCC Form provided) is streamlined and not definitive, and the County's use and acceptance of such form, or its acceptance of Contractor's statement describing why the Bidder was not legally required to be authorized to transact business in the Commonwealth, shall not be conclusive of the issue and shall not be relied upon by the Contractor as demonstrating compliance. Bidders are to complete and submit along with their bids the SCC form included herein.

ESCROW FUNDS

Bidder shall indicate below its intended use, or nonuse of the escrow provisions available:

I DO ___ WISH TO USE THE ESCROW ACCOUNT FOR RETAINED FUNDS AS PROVIDED FOR IN THIS BID DOCUMENT.

I DO NOT ___ WISH TO USE THE ESCROW ACCOUNT FOR RETAINED FUNDS AS PROVIDED FOR IN THIS BID DOCUMENT.

CERTIFICATION

I certify that the firm name given below is the true and complete name of the Bidder and that the Bidder is legally qualified and licensed, to perform all Work included in the scope of the Contract.

FROM: _____
Legal Name of Bidder (Company)

Bidder's Address: Corporate Seal

Bidder's Address

Bidder's Signature (Person legally authorized to bind the Bidder (Company) to the Contract)

Bidder's Name & Title (Typed or printed Name & Title of Person Signing)

() _____
Bidder's Telephone Number Bidder's Email Address

SECTION 00 41 50 – STATE CORPORATION COMMISSION FORM

SUMMARY

**1.01 SEE THE FOLLOWING PAGE FOR THE STATE CORPORATION COMMISSION FORM FOR
REQUIRED REGISTRATION INFORMATION**

END OF SECTION

STATE CORPORATION COMMISSION FORM (SCC)

Virginia State Corporation Commission Registration Information - The bidder:

☐ is a corporation or other business entity with the following SCC identification number:

-OR-

☐ is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust

-OR-

☐ is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the bidder in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from bidder's out-of-state location)

-OR-

☐ is an out-of-state business entity that is including with this bid an opinion of legal counsel which accurately and completely discloses the undersigned bidder's current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the *Code of Virginia*.

****NOTE** >>** Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for bids (the Commonwealth reserves the right to determine in its sole discretion whether to allow such waiver): ☐

SECTION 00 42 50 - ELECTRONIC FILE RELEASE AGREEMENT

_____ (RECIPIENT) HAS REQUESTED THAT PSH+ (PRICE STUDIOS, LLC) (ARCHITECT) PROVIDE ELECTRONIC FILES FOR THE RECIPIENT'S USE ON THE _____ PROJECT, SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS. THE ARCHITECT'S ELECTRONIC FILES ARE COMPATIBLE WITH AUTOCAD RELEASE 2013 OR HIGHER. THE ARCHITECT MAKES NO REPRESENTATION AS TO THE COMPATIBILITY OF THESE FILES WITH YOUR HARDWARE OR YOUR SOFTWARE.

DATA CONTAINED IN THESE ELECTRONIC FILES IS PART OF THE ARCHITECT'S INSTRUMENTS OF SERVICE, WHO SHALL BE DEEMED THE AUTHOR AND SHALL RETAIN ALL COMMON LAW, STATUTORY LAW, AND OTHER RIGHTS, WITHOUT LIMITATION, INCLUDING COPYRIGHTS, AND SHALL NOT BE USED BY YOU OR ANYONE ELSE RECEIVING THIS DATA THROUGH OR FROM YOU FOR ANY PURPOSE OTHER THAN THAT INTENDED. ANY OTHER USE OR REUSE BY YOU OR OTHERS WILL BE AT YOUR SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO THE ARCHITECT. THE RECIPIENT AGREES TO MAKE NO CLAIM AND HEREBY WAIVE, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY CLAIM OR CAUSE OF ACTION OF ANY NATURE AGAINST THE ARCHITECT, ITS OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR SUBCONSULTANTS WHICH MAY ARISE OUT OF OR IN CONJUNCTION WITH THE RECIPIENT'S USE OR REUSE OF THE ELECTRONIC FILES FOR ANY PURPOSE OTHER THAN THAT INTENDED.

FURTHERMORE, THE RECIPIENT SHALL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS THE ARCHITECT FROM ALL CLAIMS, DAMAGES, LOSSES, AND EXPENSES, INCLUDING ATTORNEY'S FEES, ARISING OUT OF OR RESULTING FROM SUCH USE OR REUSE, BY THE RECIPIENT OR OTHERS, OF THESE ELECTRONIC FILES FOR ANY PURPOSE OTHER THAN THAT INTENDED.

THESE ELECTRONIC FILES ARE NOT CONTRACT DOCUMENTS, NOR ARE THEY CONSIDERED AS BEING THE ENGINEERING DRAWINGS FOR THE PROJECT. SIGNIFICANT DIFFERENCES MAY EXIST BETWEEN THESE ELECTRONIC FILES AND CORRESPONDING HARD COPY CONTRACT DOCUMENTS (PROJECT ENGINEERING DRAWINGS) DUE TO ADDENDA, CHANGE ORDERS, OR OTHER REVISIONS. THE ARCHITECT MAKES NO REPRESENTATION REGARDING THE ACCURACY OR COMPLETENESS OF THE ELECTRONIC FILES RECEIVED BY THE RECIPIENT. IN THE EVENT A CONFLICT ARISES BETWEEN THE SIGNED CONTRACT DOCUMENTS PREPARED BY THE ARCHITECT AND ELECTRONIC FILES, THE SIGNED CONTRACT DOCUMENTS SHALL GOVERN. THE RECIPIENT IS RESPONSIBLE FOR DETERMINING IF ANY CONFLICTS EXIST. BY THE RECIPIENT'S USE OF THESE ELECTRONIC FILES, THE RECIPIENT IS NOT RELIEVED OF HIS DUTY TO FULLY COMPLY WITH THE CONTRACT DOCUMENTS, INCLUDING AND WITHOUT LIMITATION, THE NEED TO CHECK, CONFIRM, AND COORDINATE ALL DIMENSIONS AND DETAILS, TAKE MEASUREMENTS, VERIFY FIELD CONDITIONS AND COORDINATE YOUR WORK WITH THAT OF OTHER CONTRACTORS FOR THE PROJECT.

BECAUSE OF THE POTENTIAL THAT THE INFORMATION PRESENTED ON THE ELECTRONIC FILES CAN BE MODIFIED, UNINTENTIONALLY OR OTHERWISE, THE ARCHITECT RESERVES THE RIGHT TO REMOVE ALL INDICIA OF ITS OWNERSHIP AND/OR INVOLVEMENT FROM EACH ELECTRONIC DISPLAY OR FILE.

**SIGNATURE OF THIS AGREEMENT SHALL COVER ANY AND ALL DIGITAL
CORRESPONDENCE RELEASED FROM THE ARCHITECT TO THE RECIPIENT.**

**UNDER NO CIRCUMSTANCES SHALL DELIVERY OF THE ELECTRONIC FILES FOR USE BY
THE RECIPIENT BE DEEMED A SALE BY THE ARCHITECT AND THE ARCHITECT MAKES
NO WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY AND FITNESS
FOR ANY PARTICULAR PURPOSE. IN NO EVENT SHALL THE ARCHITECT BE LIABLE FOR
ANY LOSS OF PROFIT OR ANY CONSEQUENTIAL DAMAGES AS A RESULT OF YOUR USE
OR REUSE OF THESE ELECTRONIC FILES.**

**RECIPIENT (PLEASE PRINT NAME OF COMPANY)
SIGNATURE**

RECIPIENT'S REPRESENTATIVE

RECIPIENT'S REPRESENTATIVE (PLEASE PRINT)

WITNESS SIGNATURE

RECIPIENT'S EMAIL ADDRESS (PLEASE PRINT)

RECIPIENT'S PHONE NUMBER

END OF SECTION 00 42 500

SECTION 00 50 00 - 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. The Agreement is based on AIA A101.
- B. The General Conditions are based on AIA A201.

1.03 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bond Forms:
 - 1. Bid Bond Form: AIA A310.
 - 2. Performance and Payment Bond Form: AIA A312.
- C. Post-Award Certificates and Other Forms:
 - 1. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- D. Clarification and Modification Forms:
 - 1. Request for Information Form AIA G716.
 - 2. Substitution Request Form: CSI/CSC Form 13.1A (After the Bidding/Negotiating Stage).
 - 3. Architect's Supplemental Instructions Form: AIA G710.
 - 4. Construction Change Directive Form: AIA G714.
 - 5. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.
 - 2. Contractor's Affidavit of Release of Liens Form: AIA G706A
 - 3. Consent of Surety to Final Payment Form: AIA G707.

1.04 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2017.
- B. AIA A201 - General Conditions of the Contract for Construction; 2017.

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	00 50 00 - 1	Contracting Forms and Supplements

- C. AIA A310 - Bid Bond; 2010.
- D. AIA A312 - Performance Bond and Payment Bond; 2010.
- E. AIA G701 - Change Order; 2017.
- F. AIA G702 - Application and Certificate for Payment; 1992.
- G. AIA G703 - Continuation Sheet; 1992.
- H. AIA G704 - Certificate of Substantial Completion; 2017.
- I. AIA G706A - Contractor's Affidavit of Release of Liens; 1994.
- J. AIA G707 - Consent of Surety to Final Payment; 1994.
- K. AIA G710 - Architect's Supplemental Instructions; 2017.
- L. AIA G714 - Construction Change Directive; 2017.
- M. AIA G716 – Request for Information
- N. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 00 52 00 – AGREEMENT FORM

SUMMARY

1.01 FORM OF AGREEMENT

1.02 THE AGREEMENT TO BE EXECUTED IS ATTACHED FOLLOWING THIS PAGE.

1.03 RELATED REQUIREMENTS

- A. Section 00 72 00 – General Conditions
- B. Section 01 42 16 – Definitions

END OF SECTION

DRAFT AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the «TBD» day of «TBD» in the year «2025»
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« Blue Ridge Regional Airport »
« 525 Airport Road »
« Martinsville, VA 24112 »
« Phone: 276-957-2291 »

and the Contractor:
(Name, legal status, address and other information)

«To be determined »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

« Blue Ridge Regional Airport Terminal Building »
« 525 Airport Road »
« Martinsville, VA 24112 »
« General Aviation Terminal Building »

The Architect:
(Name, legal status, address and other information)

« Price Studios, LLC » « dba PSH+ »
« 1700 Willow Lawn Drive, Suite 200 »
« Richmond, VA 23230 »
« Ph: 804-823-2900 »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

[☐] The date of this Agreement.

[☒] A date set forth in a notice to proceed issued by the Owner.

[☐] Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[☐] Not later than (☐) calendar days from the date of commencement of the Work.

[☐] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

« »

Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item

« NONE »

Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item

« »

Price

Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item

« »

Price

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item

« »

Units and Limitations

Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

« The undersigned agrees, stipulates and fixes as liquidated damages if delayed, but not as a penalty, the sum of five hundred dollars (**\$500**) per calendar day that the undersigned together with the undersigned's surety shall pay the Owner for each calendar day or part thereof that expires after the date specified for the Substantial Completion of the Work and until the Work is Substantially Complete. The undersigned also agrees, stipulates and fixes as liquidated damages if delayed, but not as a penalty, the sum of two hundred fifty dollars (**\$250**) per calendar day that the undersigned together with the undersigned's surety shall pay the Owner for each calendar day or part thereof that expires after the date specified for the Final completion of the Work and until the Work achieves Final Completion. By bidding, the undersigned hereby agrees to be responsible for such liquidated damages. »

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« 10% »

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

<< >>
<< >>
<< >>
<< >>

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

[☐] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[☒] Litigation in a court of competent jurisdiction

[☐] Other *(Specify)*

<< >>

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

<< >>

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

<< >>
<< >>
<< >>
<< >>
<< >>
<< >>

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

<< >>
<< >>
<< >>
<< >>
<< >>

<< >>

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

<< >>

§ 8.7 Other provisions:

<< >>

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

<< >>

.5 Drawings

Number	Title	Date
<< >>		

.6 Specifications

Section	Title	Date	Pages
<< >>			

.7 Addenda, if any:

Number	Date	Pages
<< >>		

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages
« »		

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
« »			

9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

« »

OWNER (Signature)

« »« »

(Printed name and title)

« »

CONTRACTOR (Signature)

« »« »

(Printed name and title)

SECTION 00 72 00 – GENERAL CONDITIONS

SUMMARY

1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT ARE ATTACHED FOLLOWING THIS PAGE.

- A. AIA A201 – 2017 General Conditions of the Contract for Construction
- B. Bath County Airport Authority General Terms and Conditions
- C. Bath County Airport Authority Special Provisions

1.02 RELATED REQUIREMENTS

- A. Section 01 42 16 – Definitions

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	00 72 00 - 1	General Conditions

DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

«Blue Ridge Regional Airport Terminal Building
«525 Airport Road »
« Martinsville, VA 24112»

THE OWNER:

(Name, legal status and address)

« Blue Ridge Regional Airport»
« 525 Airport Road»
« Martinsville, VA 24112»
«Phone: 276-957-2291»

THE ARCHITECT:

(Name, legal status and address)

«Price Studios, LLC »«dba PSH+ »
«1700 Willow Lawn Drive, Suite 200 »
«Richmond, VA 23230 »
«Phone: 804-823-2900 »

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- 11 INSURANCE AND BONDS

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Invitation for Bids, Bid Form, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations of the Contractor under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.1.9 The Product

The term "product" as used in the Contract Documents includes materials, systems, and equipment.

§ 1.1.10 The Project Manual

The Project Manual is a volume assembled for the Work which includes, among other documents, the bidding requirements, sample forms, conditions of the Contract and Specifications.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.1.2 Wherever in the Contract Documents the words "as approved," "as directed," "as required," "acceptable," "satisfactory" and other similar words are used with reference to the Work or its performance, and without further qualification, they shall mean as approved, as directed and as required by the Architect and acceptable, satisfactory, etc. to the Architect.

§ 1.2.1.3 In case of any conflict within the Contract Documents, the Contract Documents shall be interpreted so as to ensure the most substantial and complete performance of the Work.

§ 1.2.1.4 Plumbing, Fire Protection, Mechanical, Electrical and Audiovisual drawings are diagrammatic, showing general locations and arrangements of piping, wiring, equipment and specialties; the drawings do not necessarily showing all required offsets, conditions and appurtenances required for maximum practical accessibility for operation, maintenance and clearances. The Contractor shall coordinate this Work in order to achieve the required Work and notify the Architect immediately of conditions which do not comply or will not allow for this condition.

§ 1.2.1.5 Should the Drawings and the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of Work unless otherwise directed by written Addendum or Change Order to the Contract. **§ 1.2.2** Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Notwithstanding any other language to the contrary contained in the Contract Documents, in the case of an inconsistency between Drawings and Specifications or within either Document not clarified by Addendum, the better quality and/or the more expensive and/or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

§ 1.2.4 Equipment and materials specified in the Contract Documents shall be furnished complete with all features normally provided with such items, although all features of design and construction may not be specified in complete detail. Such features shall be subject to the approval of the Architect and shall include all standard accessories and appurtenances normally provided or which are required for safe operation.

§ 1.2.5 Where references are made throughout the Specifications to standards or specifications of trade associations, standards and testing organizations, etc., or to the directions, recommendations, or specifications of manufacturers, in all cases the latest approved printed copies of these items shall apply, and all work shall be done in accordance therewith. Any variations or conflicts in the Specifications and referenced standards, directions and specifications shall be called to the Architect's attention before beginning the work.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect’s consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form.

§ 1.7.1 The Architect may furnish to the Contractor versions of the Instruments of Service in electronic form. The Contract Documents executed or identified in accordance with Section 1.5.1 shall prevail in case of an inconsistency with subsequent versions made through manipulatable electronic operations involving computers.

§ 1.7.2 The Contractor shall not transfer or reuse Instruments of Service in electronic or machine readable form without the prior consent of the Architect.

§ 1.7.3 At the Architect’s sole discretion, selected electronic (CAD) Drawing files may be made available for use by the Contractor after execution of the Contract for Construction. Such electronic files are not part of the Contract Documents. If available, the Architect shall release them to the Contractor subject to the terms and conditions established by the Architect, to which the Contractor must agree without exception prior to release of the electronic files. The Architect’s current Electronic File Release Agreement, which defines the applicable terms and conditions, can be found in the project manual.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party’s sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 1.9 The Contract Documents shall be signed by the Owner and Contractor. If either the Owner or Contractor do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number. Such terms as ‘Architect-Engineer’, ‘Engineer’, and ‘A-E’, if used in these Contract Documents, is intended to mean the Architect and its consultants unless otherwise intended by the context or usage of such terms. Such terms do not mean or include any design professional of Contractor, Subcontractor, or Owner.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner’s control and relevant to the Contractor’s performance of the Work with reasonable promptness after receiving the Contractor’s written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one electronic copy of the Contract Documents for the purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner’s Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. Failure of the Owner to notify the Contractor of necessary corrections or to stop the work shall not relieve the Contractor of any responsibilities or obligations of the Contract Documents.

§ 2.5 Owner’s Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. The Owner will notify the Architect of such action and the amount to be charged to the Contractor and will consider the comments of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner’s expenses and compensation for the Architect’s additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner immediately upon demand. Such Change Order shall be deemed agreed to by the Contractor for the purposes stated in Section 7.2.1 even if the Contractor fails to sign such Change Order. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

§ 2.5.1 The rights stated in Article 2 shall be in addition to and not in limitation of any other rights of the Owner granted in the Contract Documents or at law or in equity.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term “Contractor” means the Contractor or the Contractor’s authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. Failure by the Contractor to acquaint itself with such conditions shall not relieve it of the responsibility for successfully performing the Work pursuant to the terms of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.3.1 Dimensions of the Work shall not be determined by scale or rule. Figured dimensions shall be used at all times.

§ 3.2.3.2 The Contractor shall verify all dimensions by measurement at the job site and shall take any and all other measurements necessary to verify the Drawings and to properly lay out the Work.

§ 3.2.3.3 The Contractor shall study the Contract Documents sufficiently in advance of the actual layout of the Work to allow the Contract Documents to be interpreted or modified by the Architect, if needed.

§ 3.2.3.4 The Contractor shall verify all grades, lines, levels, and dimensions indicated on the Drawings and shall report all inconsistencies in writing to the Architect and shall receive clarification of such inconsistencies from the Architect before commencing work

§ 3.2.3.5 Dimensioned and written information takes precedence over scale on all Drawings.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs or any person in contract with Contractor relating to the subject Project knew, or should have known, that an error, inconsistency, omission, ambiguity, discrepancy, conflict or variance exists in the Contract Documents, or between the Contract Documents and any of the codes, specifications and standards set forth therein, the Contractor has the obligation to seek a clarification thereof from the Architect prior to the time the Work is performed which is affected by such error, inconsistency, omission, ambiguity, discrepancy, conflict or variance. The Contractor shall not be liable for damages relating thereto, if he has met this obligation. The Owner will welcome such a clarification request and, if deemed necessary by the Owner, the Architect or the Owner will issue a written addendum clarifying the matter in question. Should Contractor fail to seek such a clarification thereof immediately upon the discovery of the need therefor, prior to the time the said Work is performed, the Contractor thereby waives, and agrees to

indemnify and hold the Owner harmless from, any claim, suit or cause of action arising out of or related to such error, inconsistency, ambiguity, discrepancy, conflict or variance which Contractor (and any person in contract with Contractor relating to the subject Project) knew or should have known existed prior to the time the Work was performed.

§ 3.2.5 The Contractor will be held responsible for locating all underground structures such as water, oil and gas mains, water and gas services, storm and sanitary sewers and telephone and electric conduits which may be encountered during the construction operation. Contractor shall dig test holes to determine the position of the underground structures. The Contractor shall pay the cost of digging test holes and likewise shall pay the cost of the services of representatives of the owners of such utilities for locating the said utilities. The cost of determining the location of any and all utilities is to be included in the bid price.

§ 3.2.6 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for the Architect to evaluate and respond to the Contractor's requests for information, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior correspondence or documentation.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors and for any damages, losses, costs and expenses resulting from such acts or omissions.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.1.1 The Contractor shall be required to pay all utility bills (e.g., heating, air conditioning, water) related to the Work that is incurred through the date of substantial completion as defined by the Owner and Architect.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 No substitution will be considered unless the Contractor has submitted a written request for approval, and the Architect has received that request within 105 days after date of agreement, unless provisions for substitutions are stipulated in the instructions to bidders. . Each such request shall include the name of the material or equipment

for which it is to be substituted and a complete description of the proposed substitute, including drawings, cuts, performance and test data and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute will require shall be included in the request. The burden of proof of the acceptability of the proposed substitution shall be upon the party proposing the substitution. The Architect's decision to approve or disapprove a proposed substitution shall be final.

§ 3.4.2.2 By making requests for substitutions, the Contractor:

- .1 Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
- .2 Represents that the Contractor will provide the same warranty of the substitution that it would for that specified.
- .3 Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign cost, and waives all claims for additional costs related to the substitutions which subsequently become apparent.
- .4 Shall coordinate the installation of the accepted substitute, making sure changes as may be required for the Work to be complete in all aspects.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty shall not be limited pursuant to Section 12.2.2.

§ 3.5.1.1 The guarantee period for any system or systems on which required tests have not been successfully performed as of the Date of Substantial Completion for the Work, due to seasonable limitations, shall begin after the required tests have been successfully performed.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 The Contractor shall pay for all permits, governmental fees and licenses necessary for the proper execution and completion of the Work which are legally required prior to and during construction including all costs and fees for electric service. The Contractor and all its subcontractors shall comply with all codes, standards, and other regulations applicable to the Project and shall obtain a Certificate of Final Occupancy upon completion of the Project as a condition precedent to final acceptance and payment.

§ 3.7.1.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as

for other permits, fees, licenses, and inspections

by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations

concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Owner will promptly investigate such conditions and, if the Owner determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will determine an equitable adjustment in the Contract Sum or Contract Time, or both, and the recommendation of the Owner shall be binding on the Contractor. If the Contractor disputes the Owner's determination, he may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness. The Contractor shall identify the date for Owner's selection on the critical path of the Contractor's Construction Schedule and provide the Owner a minimum of fifteen (15) days' notice before this date.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect

may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.9.4 The Superintendent shall be required to carry a mobile phone, at the Contractor's expense, and for the duration of the Work. The mobile phone number shall be given to the Owner and Architect prior to commencement of any Work. In addition, day, evening, night, and weekend phone numbers shall be provided to the Owner so that the Contractor can be contacted at any time should an occurrence at the Project Site require action on the Contractor's part as determined by the Owner.

§ 3.9.5 The Superintendent employed by the Contractor shall have a minimum of five (5) years commercial experience as the primary Superintendent on projects of similar size and complexity as the Work. The Contractor shall submit to the Architect a resume and other supporting documentation showing that the proposed Superintendent is competent and has the minimum work experience required to execute the Work. The Owner reserves the right to request additional supporting documentation regarding the proposed Superintendent's qualifications and to require the Contractor to propose an alternate Superintendent who better meets the requirements contained in this Article, as may reasonably be determined by the Owner. The Contractor shall notify the Architect and Owner in writing of any proposed replacement of the Superintendent. The Contractor shall not replace a competent Superintendent without prior written approval from the Owner. The requirements contained in this Article shall apply to any proposed replacement Superintendent, regardless if the proposed tenure is to be temporary or permanent.

§ 3.9.6 The Contractor shall employ a Project Manager to be assigned to the Work. The Project Manager employed by the Contractor shall have a minimum of five (5) years commercial experience as Project Manager on projects of similar size and complexity as the Work. The Contractor shall submit to the Architect a resume and other supporting documentation showing that the proposed Project Manager is competent and has the minimum work experience required to execute the Work. The Owner reserves the right to request additional supporting documentation regarding the proposed Project Manager's qualifications and to require the Contractor to propose an alternate Project Manager who better meets the requirements contained in this Article, as may reasonably be determined by the Owner. The Contractor shall notify the Architect and Owner in writing of any proposed replacement of the Project Manager. The Contractor shall not replace a competent Project Manager without prior written approval from the Owner. The requirements contained in this Article shall apply to any proposed replacement Project Manager, regardless if the proposed tenure is to be temporary or permanent. The Project Manager shall not act as the Superintendent or replacement for the Superintendent without written approval from the Owner.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 If the Contractor shall fail to adhere to the latest approved construction schedule or to the schedule as revised, the Contractor must promptly adopt such other additional means and methods of construction, at no extra cost to the Owner, as shall make up for the time lost and shall assure completion in accordance with such schedule. If the Contractor's progress is more than 10% behind the construction schedule, partial payments may, at the sole discretion of the Owner, be withheld until such time as the Work is at least within 90% of the construction schedule.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, 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. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's acceptance of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific

deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall provide professional services that constitute the practice of architecture or engineering when such services are required by the Contract Documents for a portion of the Work and when the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.11 The Contractor shall not reproduce all or any portion of the Contract Documents. Unless otherwise directed or specified, one (1) reproducible original and six (6) copies of each Shop Drawing shall be submitted with each submittal or resubmittal. Unless otherwise directed or specified, seven (7) copies of Product Data shall be submitted with each submittal or resubmittal. Unless otherwise directed or specified, samples shall be submitted in duplicate and shall be properly labeled, bearing the name and quality of material, name of manufacturer, name of Project, name of Contractor, and date of submission.

§ 3.12.12 The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and two (2) resubmittals. The Architect's review of additional resubmittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional resubmittals.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The Contractor shall not use areas of the site not designated in the Contract Documents as part of the Work unless otherwise authorized by the owner in writing. The Contractor shall keep all activity within the defined construction fencing and work area on the civil Drawings.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.14.3 No alteration of structural members (drilling, cutting, punching, burning, etc.) shall be done without the prior approval of the Architect of the specific nature, size, location of such alterations. After such approval, the Contractor shall be responsible for performing the Work in accordance with the approved alteration and in such a manner as to prevent damage to adjacent construction. Approval to alter structural members shall not be construed to affect the Contractor's responsibility for the adequacy or the strength of such members providing such alteration is performed in accordance with the Architect's instructions.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 The Contractor shall provide an on-site waste receptacle or receptacles of sufficient size and capacity to dispose of waste materials and rubbish that accumulate on the site. These receptacles shall be emptied on a regular basis, as needed. The Contractor shall dispose of all waste materials and rubbish at an approved site for waste disposal.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of 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 (other than the Work itself), caused in whole or in part by the 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 or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages,

compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 Subject to the standard of care for applying professional judgment to information used or relied upon, Architect and its Consultants may use and rely upon design elements, technical standards, test results, and all other information ordinarily or customarily furnished or published by others, including, but not limited to, specialty contractors, manufacturers, fabricators, and suppliers.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.2.1 The Contractor shall reimburse the Owner for compensation paid to the Architect for additional site visits made necessary by the fault, neglect or request of the Contractor.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work except as provided in the Agreement between the Owner and the Architect.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. In its capacity as interpreter and judge, the Architect shall use its best efforts to secure faithful performance by the Contractor.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term “Sub-subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, within fifteen (15) days after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. The Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity.

§ 5.2.1.1 The Contractor shall provide the names of persons or entities proposed for each principal portion of the Work ("list of proposed Subcontractors") to the Architect no later than two days prior to the date of the Pre-construction Conference. The Contractor shall provide Virginia Contractor's License number and Class for each proposed Subcontractor.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.1 The Contractor shall not be released from any part of its liabilities or obligations under the Contract should any Subcontractor fail to perform in a satisfactory manner the work undertaken by him.

§ 5.3.2 Except as provided in Section 5.4, nothing contained in this Contract shall be construed as creating a contractual relationship between the Owner and any subcontractor. The Specifications do not control the Contractor in dividing the Work among subcontractors, nor do they limit the work performed by trade.

§ 5.3.3 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, and of all subcontractors and their employees. The Contractor shall also be responsible for the coordination of the work of the subcontractors and suppliers.

§ 5.3.4 The Architect will not undertake to settle any differences between or among the Contractor and its subcontractors or suppliers.

§ 5.3.5 The Contractor shall employ specialty subcontractors when required by the Specifications, at no additional expense to the Owner. “Specialty subcontractors” are subcontractors regularly engaged in the manufacture or installation of Contract items. Specialty subcontractors shall select and combine the materials involved and maintain and have available workmen skilled in the specified work. Specialty subcontractors shall be the manufacturers, licensed by the manufacturers as installers, or work under the direct supervision of the manufacturers.

§ 5.3.6 All work shall be performed by mechanics skilled in the trade.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor’s rights and obligations under the subcontract.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner’s Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term “Separate Contractor(s)” shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner’s own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term “Contractor” in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner’s own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner’s own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor’s construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Owner and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and allocate the cost among those responsible between the Contractor and Owner.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 If a change in the Work results in an adjustment to the Contract Sum, the adjustment (increase or decrease) shall be based on the following, unless noted otherwise:

- .1 Material quantities and unit prices (separated into trades; include sales tax).
- .2 Labor costs (raw cost).
- .3 Labor burden, applied to labor only, including but not limited to, worker's compensation and public liability, social security tax, old age and unemployment insurance, union welfare fund and fringe benefits. Contractor shall be required to substantiate the labor burden percentage applied to any change in contract amount. Labor burden percentage shall not exceed 30% in any case.
- .4 Construction equipment cost.
- .5 Overhead and profit combined (on Claims for net increase only), as defined in Section 7.3.11.
- .6 Cost of Premiums for Bonds (for Contractor only). Evidence of additional premium for bond shall be submitted with Claim.
- .7 Extended Overhead Costs (if applicable) which shall be established by pro-rating the value of supervision, temporary facility, and General Conditions and all other direct and indirect costs of Contractor included in the Contract Sum over the number of days included in the Contract Time.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.1.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.2 In making any change, the charge or credit for the change shall be determined by one of the following methods selected by the Owner:

- .1 By using unit prices and calculating the number of net units of Work in each part of the Work which is changed, either as the Work progresses or before the Work on the change commences, and by then multiplying the calculated number of units by the applicable unit price set forth in the Contract or by a mutually agreed unit price if none was provided in the Contract. No additional percentage markup for overhead or profit shall be added to the unit prices;
- .2 By a mutually agreed change to the Contract price and/or time allowed for completion of the Work. The Change Order shall be substantiated by documentation itemizing the estimated quantities and costs of all labor, materials, and equipment required as well as any mark-up used. The price change shall include the Contractor's overhead and profit;
- .3 By ordering the Contractor to proceed with the change to the Work and to keep and present, in such form as the Owner may direct, an accurate itemized account of the cost of the changes to the Work, both additive and deductive, together with vouchers, invoices, and labor records necessary to substantiate the account. The cost shall include an allowance for overhead and profit as set forth in the following Sections.
- .4 By using as a source for changes for the Work (except those unit prices specifically included in the Contract, if any), the unit prices in the Means Building Construction Cost Data, latest edition, R.S. Means Company, Inc., adjusted for Richmond, Virginia. These unit prices shall be used as a maximum limiting charges and minimum credits allowable for any change in the Work.

§ 7.3.3 The allowance for overhead and profit combined, included in the total cost to the Owner, shall be based on the following schedule. Stated percentages shall be applied to the NET cost of the changed work:

- .1 If the General Contractor does all or part of the changed Work, its mark-up shall be a maximum of 15% on its direct work only.
- .2 If a Subcontractor does all or part of the changed Work, its mark-up shall be a maximum of 15% on its direct work only and the General Contractor's mark-up on the Subcontractor's price shall be a maximum of 10%.
- .3 If a sub subcontractor at any tier does all or part of the changed Work, the sub subcontractor's mark-up on its direct work only shall be a maximum of 15%. The mark-up of the sub subcontractor's work by the General Contractor and all intervening tiers of subcontractors shall not exceed the total of 10%.
- .4 Those Subcontractors who do not enter into the changed Work shall not add the cost thereof.
- .5 Where Work is deleted from the Contract prior to its commencement, without substitution of similar Work, 100% of the Contract price of that Work shall be deducted. In the event that material submittals have been approved and orders placed for said materials, a lesser amount, but in no case less than 80% of the Contract price for that Work shall be deducted. Credit for Performance and Labor and Materials Bonds shall be 100%. If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
 - .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional opinion, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of the Contractor to assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 In Section 7.3.4, the following conditions shall apply:

- .1 Overhead shall include, but not be limited to, project management, field office personnel including supervision, superintendence, wages of timekeepers, watchmen and clerks, small tools, incidentals, general office expenses, insurance premiums, and all other expenses not included in "costs."
- .2 If the net value of the change results in a credit, the credit given shall be the net cost without overhead or profit (for Contractor, Subcontractor, or Sub-subcontractor). The cost as used herein shall include all

items of labor, materials, equipment, premiums and bonds.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. The Contractor shall promptly carry out the Architect's written orders. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine and to which the Owner has agreed.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents. Should the Contractor fail to complete his work on or before the time set forth in the Contract Documents or as provided in the Contract Documents covering any extensions of time, the Owner may retain the amount set forth in the Bid Form as liquidated damages for each calendar day or part thereof that the Work is not completed after the completion date.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, if accepted by the Architect and Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment, AIA Document G702, prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 Until final completion, the Owner will pay 95% of the amount due the Contractor on account of progress payments.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon 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, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.2.1 Contractor shall provide invoices, package slips, or other form of supporting data for materials stored on-site claimed on the progress payment, unless it can be verified through on-site observations. The Contractor shall maintain concise bill of materials and label materials stored on-site for ready identification and verification.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in general conformance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for general conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents if approved by the Owner, and shall so notify the Architect.

Owner will make payments, less 5% retainage, to the Contractor approximately 30 days after the Contractor's Application for Payment has been approved by the Architect and submitted to the Owner for payment.

§ 9.6.1.1 The Owner may withhold payments to the Contractor notwithstanding the Architect's certification if it is necessary, in the Owner's opinion, to do so to protect the Owner from loss due to any of the reasons set forth in Sub-

Sections 9.5.1.1 through 9.5.1.7.

§ 9.6.2

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 If the Contractor shall fail to adhere to the approved progress schedule or to the schedule as revised, he must promptly adopt such other additional means and methods of construction as shall make up for the time lost and shall ensure completion in accordance with such schedule. If the Contractor's progress is more than 10% behind his projected schedule, partial payments may be withheld until such time as the Work is at least within 90% of the Project schedule.

§ 9.6.9 The Owner will pay the Contractor for stored materials to the extent permitted by the Contract Documents. In no case shall the Contractor be entitled to payment from the Owner for materials stored off the job site unless the Contractor has supplied the Owner with a certificate of insurance showing sufficient insurance coverage against loss or destruction of material, with the Owner named as additional insured; and unless the Contractor has notified the Owner in writing of the location of the materials.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.1.1 The date of Substantial Completion is the date determined by Architect for such stage when the Work is sufficiently complete that the Owner can fully occupy or utilize the Work for its intended purpose, with all of the

Work's parts and systems operable as required by the Contract Documents. Only incidental cleaning, if required beyond cleaning needed for the Owner's full occupancy or utilization, may remain for final completion.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.3.1 Except with the consent of the Owner, the Architect will provide no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.6 Substantial Completion shall occur within the time frame designated on the Bid Form following the Contractor's receipt of the Notice to Proceed. At the time the Contractor makes a written request for an inspection to determine Substantial Completion, in accordance with Article 9.8 of the General Conditions, the following must be accomplished:

- .1 The Contractor shall have made his own punch list inspection and corrected those items noted.
- .2 The Contractor shall have provided the Architect with a list of items which remain to be completed or corrected, but which do not preclude the use of the premises by the Owner for its intended purposes. Items not complete, including punch list items which require occupants to change their procedures to avoid ladders, painting activities, and similar obstructions created by the Contractor are not allowed. All such items must be complete prior to Substantial Completion.
- .3 Should additional site visits or other work by the Architect be required which is attributable to the Contractor, or the Contractor's failure to complete Work in a satisfactory manner, the cost of the Architect's time and reimbursable expenses associated with such visits or work will be the Contractor's responsibility, and will be charged to the Contractor. Additional Site visits or work relating to completing the Contract, or work required by the Architect after the scheduled visit for Certification of Final Payment will also be charged to the Contractor. The Owner, using the Architect's approved hourly billing rates, will make all such charges to the Contractor.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or

use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.1.1 Except with the consent of the Owner, the Architect will provide no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained final completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.10.6 Final Completion shall occur within the time frame designated on the Bid Form following the Contractor's receipt of the Notice to Proceed. At the time the Contractor makes a written request for an inspection to determine Final Completion, in accordance with Article 9.10 of the General Conditions, the following must have been accomplished:

- .1 Should additional site visits or other work by the Architect be required which is attributable to the Contractor, or the Contractor's failure to complete Work in a satisfactory manner, the cost of the Architect's time and reimbursable expenses associated with such visits or work will be the Contractor's responsibility, and will be charged to the Contractor. Additional Site visits or work relating to completing the Contract, or work required by the Architect after the scheduled visit for Certification of Final Payment will also be charged to the Contractor. The Owner, using the Architect's approved hourly billing rates, will make all such charges to the Contractor.

§ 9.10.7 Before receiving final payment, the Contractor shall provide the Owner with proof of the complete release or satisfaction of all claims in a form approved by the Owner, including but not limited to liens.

§ 9.11 Liquidated Damages

§ 9.11.1 The Contractor, and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the Work is substantially complete.

§ 9.11.2 The Owner has established this amount as the proper measure of liquidated damages which the Owner will sustain per day by the failure of the Contractor to substantially complete the Work at the stipulated time and it is not to be construed in any sense as a penalty.

§ 9.11.3 In addition to Liquidated Damages, the Contractor shall pay to the Owner the cost of extended architectural and engineering (including Architect's on-site representative(s), if any, on-site) services rendered beginning at 61 days from the date of Substantial Completion required by the Contract, as adjusted if applicable, and continuously until final completion is achieved.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel. When the use of storage of explosives or other hazardous materials or equipment or unusual methods are necessary, the Contractor shall give the Owner reasonable advance notice.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party 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, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding seven (7) days after discovery for notice given by the Contractor and twenty-one (21) days after discovery for notice given by the Owner. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written notice from the Owner to the Contractor.

§ 10.3.3. All new construction shall be free of any and all asbestos-containing materials (ACM). The Contractor shall ensure that no asbestos-containing materials and/or components are used or incorporated into the Work. The Owner may perform at its own expense any inspection and testing it deems necessary to ensure the compliance to these requirements. Where such testing of samples of materials in-place or on the job shows asbestos in the new Work, the Contractor shall remove and properly dispose of any such asbestos-containing materials and/or components at his sole cost and expense, and he shall replace these items with non- asbestos-containing material and/or components as approved by the Architect

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the Commonwealth of Virginia. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.1.1 In accordance with the requirement of sub-paragraph 11.1.1, the Contractor shall provide the Owner with proof of insurance with minimum limits as follows, before beginning the Work:

- .1** Worker's Compensation: As required by statute
- .2** Employer's Liability
Each accident \$500,000
Disease, policy limit \$500,000
Disease, each employee \$500,000
- .3** Commercial General Liability
Each occurrence \$1,000,000
General aggregate \$2,000,000
Personal and advertising injury \$1,000,000
Explosion, collapse, and underground (XCU) \$1,000,000
Products and completed operations aggregate \$2,000,000
General aggregate per project \$2,000,000
- .4** Automobile Liability
Each accident \$1,000,000
- .5** Umbrella or excess liability \$10,000,000

§ 11.1.1.2 Immediately upon obtaining the policies, the Contractor shall notify the Owner in writing that it has done so and shall provide the Owner with certificates of insurance, in a form acceptable to the Owner, giving the numbers of the policies and the limits thereon.

§ 11.1.1.3 The Contractor shall maintain the policies for the duration of the Contract and shall maintain Completed Operations coverage for a period of three (3) years after completion of the Contract

§ 11.1.1.4 The Contractor shall either (1) require each of its subcontractors to procure and maintain, during the life of its subcontract, subcontractor's Liability Insurance of the same type and in the same amounts as specified in this Article or (2) insure the activities of its subcontractors in its own policy.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. Bonds shall be executed by one or more surety companies which are legally authorized to perform business in the Commonwealth of Virginia, and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to one hundred percent of the Contract Sum. Such

bonds shall be for the protection of claimants who have and fulfill contracts to supply labor and materials to the Contractor under Contract, or to any Subcontractors, in the prosecution of the Work.

§ 11.1.3 The Contractor shall deliver the required bonds to the Owner at the time of execution of the Contract, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

§ 11.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

§ 11.1.3 This Section 11.4 shall not preclude or prevent the Contractor (at its option and at no additional cost to the Owner) from requiring Subcontractors to furnish like performance and payment bonds for the Work provided in their Subcontracts.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's liability insurance.

§ 11.2.1 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the Commonwealth of Virginia, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. The maximum deductible shall be \$10,000. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by Owner and all other persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.2 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's, Owner's other professional advisors and contractors, and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.3 If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

§ 11.3.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the work in transit, unless separately insured by the contractor.

§ 11.3.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.4 BOILER AND MACHINERY INSURANCE

The Contractor shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.5 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property due to fire or other hazards, however caused.

§ 11.6 Waivers of Subrogation

§ 11.6.1 The Contractor waives all rights against (1) the Owner, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The policies of insurance purchased and maintained by the Contractor shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.7 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss.

§11.8 Adjustment and Settlement of Insured Loss

§ 11.8.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.8.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or Owner or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in general compliance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so. If the Contractor fails to correct nonconforming Work within 14 days after receipt of notice from the Owner, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work. The guarantee period of any system or systems on which, due to seasonal limitations, required tests have not been successfully completed on the date of acceptance of the Project by the Owner shall begin on the date of first use by the Owner, provided that the required tests are successfully performed during the guarantee period. Otherwise, the guarantee period shall begin when the required tests have been successfully completed.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so in a timely manner and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work

§ 13.5 Cooperation and Coordination

§ 13.5.1 The Contactor shall be responsible for making necessary arrangements with governmental departments, public utilities, public carriers, services companies, cable television, and corporations owning or controlling roadways, water, sewer, gas, electricity, telephone, and telecommunications facilities, such as pavement, piping, wires, cables conduits, poles and guys, including incidental structures connected therewith, that are encountered in the work in order that such items may be properly shored, supported, protected, or relocated.

§ 13.5.2 The Contractor shall give proper notices, comply with requirements of such parties in the performance of the Work, and permit entrance of such parties on the Project in order that they may perform their necessary work.

§ 13.6 Audit

The Contractor shall retain all books, records and other documents relative to this contract for five (5) years after final payment, or until audited by the Owner, whichever is sooner. The Owner or its authorized representative shall have full access to and the right to examine any of said materials during said period. The Contractor shall include the provisions above in every subcontract or purchase order, so that the provisions will be binding upon each subcontractor or vendor.

§ 13.7 Availability of Funds

It is understood and agreed between the parties herein that the Owner shall be bound hereunder only to the extent of lawfully appropriated funds.

§ 13.8 Drug Free Workplace

During the performance of this contract, the Contractor agrees to (i) provide a drug-free workplace for the Contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor. For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a Contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the contract.

§ 13.9 ANTI-DISCRIMINATION: By submitting their bids, Bidders certify to the Owner that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and § 2.2-4311 of the *Virginia Public Procurement Act (VPPA)*. If the award is made to a faith-based organization, the organization shall not discriminate against any recipient of goods, services, or disbursements made pursuant to the contract on the basis of the recipient's religion, religious belief, refusal to participate in a religious practice, or on the basis of race, age, color, gender or national origin and shall be subject to the same rules as other organizations that contract with public bodies to account for the use of the funds provided. However, if the faith-based organization segregates public funds into separate accounts, only the accounts and programs funded with public funds shall be subject to audit by the public body (*Code of Virginia*, § 2.2-4343.1E).

During the performance of this Contract, the Contractor agrees as follows:

- .1 The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment,

- notices setting forth the provisions of this non-discrimination clause.
- .2 The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such Contractor is an equal opportunity employer.
 - .3 Notices, advertisements, and solicitations placed in accordance with federal law, rule, or regulation shall be deemed sufficient for the purpose of meeting requirements of this section.
 - .4 The Contractor does not, and shall not during the performance of this Contract, knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.
 - .5 Contractor hereby represents it is organized as a stock or non-stock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership and is authorized to transact business in the Commonwealth of Virginia as a domestic or foreign business entity if so required by Title 13.1 or Title 50 or as otherwise required by law.

The Contractor will include the provisions of the foregoing Sections 3.7.2.1 and 3.7.2.2 in every Subcontract or purchase order of over ten thousand dollars (\$10,000.), so that the provisions will be binding upon each Subcontractor or vendor.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise violates any provision of the Contract Documents
- .5 **is adjudged a bankrupt, or if it makes a general assignment for the benefit of its creditors, or if a receiver is appointed on account of its insolvency.**

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be determined by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by the Contractor seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question asserted by the Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the Contractor. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the Contract Documents and applicable law, whichever provides for a sooner date. The Contractor waives all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

Virginia Public Procurement Act. Invoices for all services or goods provided by the Contractor shall be delivered to the Airport Authority no later than 30 days following the conclusion of the work or delivery of the goods.

- .1 Notwithstanding any claim provision in Article 15, all claims shall be filed in accordance with the Contractual Claims provisions included in the Project Manual.
- .2 Throughout Article 15, references to the filing of claims by other parties shall be deleted. Claims provisions shall apply only to the Contractor.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Contract Documents. The Architect will issue Certificates for Payment in accordance with the Contract Documents. .

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.6.2.1 Weather data utilized to support claims for adverse weather conditions shall be that obtained from the National Oceanic and Atmospheric Administration (NOAA) for the nearest weather station to the Project. Adverse weather conditions are defined as measurable precipitation (MP) of 0.1 " or more, or 1.0" or more of snow or ice pellets, or freezing temperature (FT) for a day (24 hours) when the temperature remains at 32 degrees Fahrenheit or below. Only measurable precipitation (MP) or freezing temperature (FT) shall be permitted to be claimed for any one calendar day. Time extensions for adverse weather conditions shall be cumulative over the duration of the Project time and claims shall not be permitted for days for drying out of rain-soaked soil, snow accumulation, or similar weather-related conditions or resulting Project conditions.

- .1 The Contractor agrees that it shall not be entitled to a time extension for normal inclement weather (weather conditions other than "adverse weather conditions") which can be expected at the Project locale due to precipitation or temperature, based upon actual data from the National Oceanic and Atmospheric Administration (NOAA) for the locality closest to the Project for a five-year period preceding the date of the Contract. The Contractor acknowledges and warrants that in making its proposal or bid and Construction Schedule for the Work, it gave due care and consideration to this expected number of calendar days of inclement weather for the locale of the Project and allowed for the impact of normal inclement weather on subsequent Work. During the time of performance, should the expected number of calendar days of normal inclement weather for the locale of the Project be less than originally anticipated by the Contractor and the Owner, at the time of contracting, those days not so affected by normal inclement weather shall be considered float time in the Construction Schedule.
- .2 The Contractor agrees that the measure of adverse weather conditions due to MP or FT during the period covered by this Contract shall be the number of days where adverse weather conditions comply with the weather data referenced in subparagraph 15.1.6.2.1.
- .3 Extensions of time will be made only for days in which abnormal adverse weather criteria cited in subparagraph 15.1.6.2.1 occur.
- .4 If the total calendar days lost due to adverse weather conditions, from the start of the Work at the Project by the Contractor until the principal portions of the Work are enclosed, exceeds the total number of days to be expected to be lost for the same time period, a time extension, if granted, shall only be for the number of calendar days needed to equal the excess number of calendar days lost to such adverse

weather conditions. Time extensions from weather delays shall not entitle the Contractor to "extended overhead" recovery.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor waives Claims against each other for consequential damages arising out of or relating to this Contract. This waiver includes

- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This waiver is applicable, without limitation, to all consequential damages due to the Owner's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Architect for initial decision.

§ 15.2.2 The Architect will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Architect is unable to resolve the Claim if the Architect lacks sufficient information to evaluate the merits of the Claim or if the Architect concludes that, in the Architect's sole discretion, it would be inappropriate for the Architect to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Architect may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Architect in rendering a decision.

§ 15.2.4 If the Architect requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Architect when the response or supporting data will be furnished, or (3) advise the Architect that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Architect will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Architect will render an initial decision approving or rejecting the Claim, or indicating that the Architect is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the contractor.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

TABLE

BLUE RIDGE REGIONAL AIRPORT
GENERAL TERMS AND CONDITIONS

1. **eVA BUSINESS-TO-GOVERNMENT VENDOR REGISTRATION:** The eVA Internet electronic procurement solution, web site portal www.eva.virginia.gov streamlines and automates government purchasing activities. All vendors desiring to provide goods and/or services to the Blue Ridge Regional Airport shall participate in the eVA Internet e-procurement solution by completing the free eVA Vendor Registration. All Bidders or Offerors must register in eVA, failure to register may result in the bid/proposal being rejected. The Authority advertises all competitive solicitations on eVA but does not issue purchase orders through eVA unless required to by the terms and conditions of a state issued contract.
2. **ACCEPTANCE OF GOODS/SERVICES:** Goods/services delivered shall remain the property of the CONTRACTOR until a physical inspection or actual usage of the goods/services is made and thereafter accepted to the satisfaction of the OWNER. The goods/services must comply with the specifications and terms and conditions of the Request and be of the highest quality. In the event the goods/services supplied to the OWNER are found to be defective or not to conform to specifications, the OWNER reserves the right to cancel the contract upon written notice to the CONTRACTOR and return products to CONTRACTOR at the CONTRACTOR's expense.
3. **ANNOUNCEMENT OF AWARD:** Upon the award or the announcement of the decision to award a contract as a result of this solicitation, the Authority will publicly post such notice on the DGS/DPS eVA VBO website (www.eva.virginia.gov) for a minimum of 10 days.
4. **ANTI-DISCRIMINATION:** By submitting their bids, Bidders certify to the Authority that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and § 2.2-4311 of the *Virginia Public Procurement Act (VPPA)*. If the award is made to a faith-based organization, the organization shall not discriminate against any recipient of goods, services, or disbursements made pursuant to the contract on the basis of the recipient's religion, religious belief, refusal to participate in a religious practice, or on the basis of race, age, color, gender or national origin and shall be subject to the same rules as other organizations that contract with public bodies to account for the use of the funds provided; however, if the faith-based organization segregates public funds into separate accounts, only the accounts and programs funded with public funds shall be subject to audit by the public body (*Code of Virginia*, § 2.2-4343.1E).

In every contract over \$10,000 the provisions in A and B below apply:

A. During the performance of this contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
2. The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such Contractor is an equal opportunity employer.
3. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

B. The Contractor will include the provisions of (A) above in every subcontract or purchase order over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.

Blue Ridge Regional Airport
General Terms and
Conditions

5. APPLICABLE LAWS AND COURTS: This solicitation is governed by the laws of the Commonwealth of Virginia. Any dispute or controversy arising out of or relating to this solicitation or otherwise shall be brought in the Henry County Circuit Court or in the United States District Court for the Eastern District of Virginia, Richmond Division; provided, however, that prior to the instigation of any such action (other than an action for equitable relief) a meeting shall be held at a mutually agreed upon location, attended by individuals with decision-making authority to attempt in good faith to negotiate a resolution of the dispute.
6. ASSIGNMENT OF CONTRACT: A contract shall not be assignable by the Contractor in whole or in part without the written consent of the Authority.
7. AUDIT: The Contractor shall retain all books, records and other documents relative to this contract for five (5) years after final payment, or until audited by the Authority, whichever is sooner. The Authority or its authorized representative shall have full access to and the right to examine any of said materials during said period. The Contractor shall include the provisions above in every subcontract or purchase order, so that the provisions will be binding upon each subcontractor or vendor.
8. AVAILABILITY OF FUNDS: It is understood and agreed between the parties herein that the Authority shall be bound hereunder only to the extent of lawfully appropriated funds.
9. BID PRICE CURRENCY: Unless stated otherwise in this solicitation, Bidders shall state bid prices in US dollars.
10. BIDDER, OFFEROR AND CONTRACTOR COMPLIANCE: All Bidders, Offerors and Contractors shall comply with the *Virginia Public Procurement Act*, (*Code of Virginia* § 2.2-4300, et seq.), and all applicable County policies, regulations and procedures adopted pursuant thereto.
11. CONTRACT CHANGES: Any changes to the contract must be approved through issuance of a written contract addendum or change order. The Authority will not assume responsibility for the cost of any changes made without issuance of a written contract addendum or change order.
12. CONTRACTOR'S PERFORMANCE:
 - A. The Contractor agrees and covenants that its agents and employees shall comply with all County, State and Federal laws, rules and regulations applicable to the business to be conducted under the Contract.
 - B. The Contractor shall ensure that its employees shall observe and exercise all necessary caution and discretion so as to avoid injury to person or damage to property of any and all kinds.
 - C. The Contractor shall cooperate with County officials in performing the Contract work so that interference with normal operations will be held to a minimum.
13. CONTRACTUAL CLAIMS: Contractual claims, whether for money or other relief, shall be submitted in writing no later than 60 days after final payment; however, written notice of the Contractor's intention to file such claim shall have been given at the time of the occurrence or beginning of the work upon which the claim is based. Any notice or claim shall be delivered to the Authority and shall include a description of the factual basis for the claim and a statement of the amounts claimed or other relief requested. The County Administrator will render a decision on the claim and will notify the Contractor within 30 days of receipt of the claim. The Contractor may appeal the decision of the County Administrator to the Board of Supervisors by providing written notice to the County Administrator, within 15 days of the date of the decision. The Board of Supervisors shall render a decision on the claim within 60 days of the date of receipt of the appeal notice and such decision shall be final unless the Contractor appeals the decision in accordance with the Virginia Public

Procurement Act. Invoices for all services or goods provided by the Contractor shall be delivered to the County no later than 30 days following the conclusion of the work or delivery of the goods.

14. DEBARMENT STATUS: By submitting their bids, Bidders certify that they are not currently debarred by the County from submitting bids or proposals on contracts for the type of goods and/or services covered by this solicitation, nor are they an agent of any person or entity that is currently so debarred.
15. DEFAULT: In case of failure to deliver goods or services in accordance with the contract terms and conditions, the County, after due written notice as required by the NOTIFICATION clause, may procure them from other sources and hold the Contractor responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies which the County may have.
17. DRUG-FREE WORKPLACE: During the performance of this contract, the Contractor agrees to (i) provide a drug-free workplace for the Contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor. For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a Contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the contract.
18. ETHICS IN PUBLIC CONTRACTING: By submitting their bids, Bidders certify that their bids are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other Bidder, supplier, manufacturer or subcontractor in connection with their bid, and that they have not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.
19. FINANCIAL STATEMENTS: All Bidders, by submission of a response to this solicitation, agree to provide the Authority, within 10 calendar days of the Authorities request, a copy of its most recent audited financial statement(s), and those of any of its parent companies and/or subsidiaries having material influence on the goods/services provided, or to be provided, under the resultant contract with the Airport. The financial statement(s) shall be accompanied by a letter signed by, as applicable to the type of business, a corporate officer, partner, or owner, stating that the accompanying financial statement(s) is/are complete and is/are the most recent audited financial statement(s) available.

The financial statement(s) shall be provided at no charge to the Authority, and the Authority shall be under no obligation to return the financial statement(s).

The Contractor chosen as a result of this solicitation shall include this same provision in the contracts of all subcontractors and any other entity providing goods or services related to the County contract, so as to guarantee the County's rights to obtain financial statements. Should the Contractor fail to ensure the County's rights under this section, the Contractor shall be liable to the County for all reasonable costs and expenses the County may incur in obtaining financial statements which would have otherwise been available under the provisions of this section.

20. IMMIGRATION REFORM AND CONTROL ACT OF 1986: The Contractor certifies that they do not, and shall not during the performance of the contract, knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.

21. INDEMNIFICATION: Contractor agrees to indemnify the Authority, its officers, agents, and employees for any loss, liability, cost (including attorney's fees), or reasonable settlement cost incurred as a result of any claims, damages and actions of any kind or nature, whether at law or in equity, arising from or caused by the use of any materials, goods, or equipment of any kind or nature furnished by the Contractor/any services of any kind or nature furnished by the Contractor, provided that such liability is not attributable to the sole negligence of the Authority or to failure of the Authority to use the materials, goods, or equipment in the manner already and permanently described by the Contractor on the materials, goods or equipment delivered. The Authority will not agree to indemnify the Contractor.
22. INDEPENDENT CONTRACTOR: The Contractor is an independent Contractor and nothing contained in the contract shall constitute or designate the Contractor or any of its agents or employees as employees of the Authority.
23. LICENSES AND PERMITS: The Contractor shall secure and pay for all permits, governmental fees and licenses necessary for the proper execution and completion of the Contractor's work which are legally required prior to and during the work, including software licenses or other intellectual property permissions, unless otherwise specified by the County.
24. MANDATORY USE OF AUTHORITIES FORM AND TERMS AND CONDITIONS: Failure to submit a bid on the official Authority form provided for that purpose shall be a cause for rejection of the bid. Modification of or additions to any portion of the Invitation for Bids may be cause for rejection of the bid; however, the Authority reserves the right to decide, on a case by case basis, in its sole discretion, whether to reject such a bid as nonresponsive. As a precondition to its acceptance, the Authority may, in its sole discretion, request that the Bidder withdraw or modify nonresponsive portions of a bid which do not affect quality, quantity, price, or delivery. No modification of or addition to the provisions of the contract shall be effective unless reduced to writing and signed by the parties.
25. NOTIFICATION: Any notice required by the contract shall be effective if given by registered mail, return receipt requested, to the Contractor in the name and at the address given in their bid; provided that change of address shall be effective if given in accordance with this paragraph. Unless otherwise specified, any notice to the Authority shall be given to the Blue Ridge Regional Airport: 525 Airport Rd, Martinsville, Virginia 24112. The Contractor agrees to notify the Authority immediately of any change of legal status or of address.
26. PAYMENT:
- A. To Prime Contractor:
1. Invoices for items ordered, delivered and accepted shall be submitted by the Contractor directly to the payment address shown on the purchase order/contract. All invoices shall show the contract number and/or purchase order number.
 2. Any payment terms requiring payment in less than 30 days will be regarded as requiring payment 30 days after invoice or delivery, whichever occurs last. This shall not affect offers of discounts for payment in less than 30 days, however.
 3. In those cases where payment is made by mail, the date of postmark shall be deemed to be the date payment is made (*Code of Virginia*, § 2.2-4353).
 4. Unreasonable Charges. Under certain emergency procurements and for most time and material purchases, final job costs cannot be accurately determined at the time orders are placed. In such cases, Contractors should be put on notice that final payment in full is contingent on a determination of reasonableness with respect to all invoiced charges. Charges which appear to be unreasonable will be researched and challenged, and that portion of the invoice held in abeyance until a settlement can be reached. Upon determining

that invoiced charges are not reasonable, the Authority shall promptly notify the Contractor, in writing, as to those charges which it considers unreasonable and the basis for the determination. A Contractor may not institute legal action unless a settlement cannot be reached within thirty (30) days of notification. The provisions of this section do not relieve the Authority of its prompt payment obligations with respect to those charges which are not in dispute (*Code of Virginia*, § 2.2-4363).

B. To Subcontractors:

1. A Contractor awarded a contract under this solicitation is hereby obligated:
 - a. To pay the subcontractor(s) within seven (7) days of the Contractor's receipt of payment from the Authority for the proportionate share of the payment received for work performed by the subcontractor(s) under the contract; or
 - b. To notify the Authority and the subcontractor(s), in writing, of the Contractor's intention to withhold payment and the reason.
2. The Contractor is obligated to pay the subcontractor(s) interest at the rate of one percent (1%) per month (unless otherwise provided under the terms of the contract) on all amounts owed by the Contractor that remain unpaid seven (7) days following receipt of payment from the Authority, except for amounts withheld as stated in (b) above. The date of mailing of any payment by U. S. Mail is deemed to be payment to the addressee. These provisions apply to each sub-tier Contractor performing under the primary contract. A Contractor's obligation to pay an interest charge to a subcontractor may not be construed to be an obligation of the Authority.

C. The Authority encourages Contractors to accept electronic and credit card payments. Finance charges and or fees imposed by the Contractor on any invoice shall not be paid by the Authority.

27. PRECEDENCE OF TERMS: The following General Terms and Conditions; ANTI-DISCRIMINATION, APPLICABLE LAWS AND COURTS, ETHICS IN PUBLIC CONTRACTING, IMMIGRATION REFORM AND CONTROL ACT OF 1986, DEBARMENT STATUS, MANDATORY USE OF COUNTY FORM AND TERMS AND CONDITIONS, PAYMENT shall apply in all instances. In the event there is a conflict between any of the other General Terms and Conditions and any Special Terms and Conditions in this solicitation, the Special Terms and Conditions shall apply.
28. QUALIFICATIONS OF BIDDERS: The Authority may make such reasonable investigations as deemed proper and necessary to determine the ability of the Bidder to perform the services/furnish the goods and the Bidder shall furnish to the Authority all such information and data for this purpose as may be requested. The Authority reserves the right to inspect Bidder's physical facilities prior to award to satisfy questions regarding the Bidder's capabilities. The Authority further reserves the right to reject any bid if the evidence submitted by, or investigations of, such Bidder fails to satisfy the Authority that such Bidder is properly qualified to carry out the obligations of the contract and to provide the services and/or furnish the goods contemplated therein.
29. ROYALTY AND LICENSE FEES AND COPYRIGHT, TRADEMARK AND PATENT PROTECTION:
 - A. By submitting their bid, Bidders certify that there will be no violation of copyrights or patent rights in manufacturing, producing, or selling the commodities or services to be ordered as a result of this solicitation.
 - B. Unless specified otherwise in the contract, the Contractor shall pay all royalty and license fees relating to the items covered by the contract.
 - C. In the event any third party shall claim that the manufacture, use and sales of these goods offered hereby constitutes an infringement of any copyright, trademark, or patent, the Contractor shall indemnify and hold harmless the Authority from any cost, expense, damage or loss incurred in any manner by the Authority on account of such alleged infringement.

30. SEVERABILITY: Each paragraph and provision of the resultant contract will be severable from the entire agreement and if any provision is declared invalid, the remaining provisions shall remain in effect.
31. TERMINATION FOR CONVENIENCE: Unless otherwise stated, any resultant contract may be terminated, in whole or in part, whenever the Authority determines that such a termination is in its best interests. Any such termination shall become effective on the date stated in a written notice of termination to the Contractor sent at least five days prior to the stated termination date. The notice of termination shall state the extent to which performance shall be terminated. The Contractor shall be paid for all goods delivered or services successfully completed prior to the termination date.
33. TESTING AND INSPECTION: The Authority reserves the right to conduct any test/inspection it may deem advisable to assure goods and services conform to the specifications.

END BLUE RIDGE REGIONAL AIRPORT GENERAL TERMS AND CONDITIONS

(This section intentionally blank)

BLUE RIDGE REGIONAL AIRPORT
SPECIAL PROVISIONS

1. Final Payment

The final ten percent (10%) of the contract value shall not be paid until the Owner receives final payment from the funding agency(s). This requires executing and submitting the final contractor pay request, final change order, certificate of substantial completion, warranty of construction, lien and claims release, and certificate of final acceptance. Once all final project documents are executed and submitted, the documents shall be submitted by the Owner to the funding agencies for final review and payment. Once final payment has been received by the Owner, the contractor shall receive final payment.

2. Additional Insured Requirements

The Contractor shall specify the Owner and the Architect as named additional insured in all insurance required under the provisions of AIA Form A101 "Insurance Requirements". The Contractor shall provide an allowance for the cost, if any, for providing this additional insurance. Upon receipt documenting actual amount and proof of payment, the Contractor can submit for the actual cost under item "SP-1 Non- AIP Insurance" up to the allowance amount. Any additional cost above the allowance shall be at the Contractor's expense.

3. Funding

It shall be understood that this project is funded by state, and local monies and, therefore, the Contractor shall be subject to all laws and regulations applicable to recipients of such funds.

4. Warranty

Reference AIA A201 – 2017 General Conditions of the Contract for Construction.

5. Concurrent Work

The Owner reserves the right to conduct concurrent work during the course of the project. This work may or may not be conducted by the Owner.

6. Foreign Object Debris

The contractor shall be responsible for all (FOD) Foreign Object Debris, originating from the construction area. Waste and loose material shall be removed immediately and continuously during the course of work. The removal and disposal of all debris shall be the responsibility of the Contractor. All debris shall be disposed of off the project site and Airport property in conformance with prevailing local ordinances, codes, and Federal laws.

7. Dust Control

The Contractor is advised that aircraft maintenance operations are conducted adjacent to the project. Special attention to dust control will be required during the course of the project. The use of water and calcium chloride shall be anticipated. The Architect reserves the right to halt work or halt hauling operations in non-conforming areas, if corrective actions are not promptly taken by the Contractor to control dust.

8. Airfield Pavements

All work requiring access to any existing airport pavements shall be reviewed and coordinated with the Owner and Civil Engineer. These pavements are designed for aircraft on single and dual gear configurations. The CONTRACTOR shall preserve and/or protect existing and new pavements from damage due to construction operations. Existing pavements which are damaged shall be replaced or re-paved at the CONTRACTOR'S expense. The CONTRACTOR shall take immediate action to alleviate the problem.

9. Airspace Restrictions

All construction operations exceeding 25 feet in height, including but not limited to crane activities, require Owner &/or (FAA) Federal Aviation Administration notification.

10. Airfield Operations

It is the intent of the OWNER to minimize interference with or impact upon airfield and aircraft operations. The CONTRACTOR shall coordinate its activities while working near the (AOA) aircraft operational area. Before starting its operations at any location on the airport, the CONTRACTOR shall assure proper safety precautions and separations are in place in accordance with FAA Advisory Circular (AC) 150/5370-2G, "Operational Safety on Airports During Construction".

11. Communications

The CONTRACTOR shall keep the Architect, Owner and the Civil Engineer apprised of his/her scheduled construction activities in order to allow proper notification to the airport manager for coordination with airfield operations. The CONTRACTOR shall have a two-way radio at the jobsite at all times work is in progress. The CONTRACTOR shall monitor the ground control frequency or the Common Traffic Advisory Frequency (CTAF) or Airport UNICOM frequency.

12. Final Inspections

The Architect will attend a substantial completion inspection and one final inspection of the completed work and the completed punch list items. These inspections will be scheduled when the Contractor indicates that the work is complete and ready for inspection or that the punch list is totally complete and the final inspection can be made. If the Architect is required to conduct more than two (2) inspections outlined above, the charges for the Architect's services associated with such additional inspections shall be deducted by the Owner from the Contractor's final payment for the project.

13. Existing Construction

The Contractor shall protect existing items airfield items in the project area that are not identified to be removed or modified. These may include pavements, markings, lighting fixtures, signs, survey monuments, etc. An inventory of conditions of the project and all items that are to remain shall be taken before construction begins and the Contractor shall be responsible for the cost of replacement of any fixtures damaged by its operations.

14. Construction Flags and Amber Lights

If work requires access to the Air Operation Area (AOA), the Contractor shall notify the Owner and Civil Engineer in advance and obtain approval. At a minimum, the Contractor shall furnish amber flashing hazard beacons or aircraft warning flags on all vehicles and equipment in accordance with Advisory Circular (AC) 150/5210-5D, "Painting, Marking, and Lighting of Vehicles Used on an Airport". Amber flashing hazard beacons or aircraft warning flags may be used during the day. Amber flashing hazard beacons are required for nighttime operations.

The beacons shall be mounted on the uppermost part of the vehicle structure or equipment so that it will be visible from any direction, day and night, including from the air. The flags shall be at least a 3-foot square having a checkered pattern of international orange and white squares at least 1 foot on each side in accordance with AC 150/5210-5D. Flags on equipment shall be mounted on a staff not less than 8 feet in length.

15. Project Supervision

The Contractor shall have a project Superintendent on the project site at all times that construction is in progress. The Superintendent's name and qualifications shall be furnished to the Owner and Architect at the Pre-Construction Meeting. This individual shall not be replaced without prior written notice to the Owner and Architect, except under extraordinary circumstances, in which event immediate written notice shall be given to the Owner and Architect. The superintendent will be the Contractor's representative at the site and shall have the authority to act on behalf of the Contractor and to receive any and all notices or instructions given pursuant to the Contract Documents. The superintendent shall be an employee of the Contractor. The Contractor shall provide competent and suitable personnel, equipment and supplies to perform the work required by the Contract Documents. The Superintendent shall at all times maintain good discipline and order at the site.

16. Storage / Staging Area

All construction staging areas, material storage areas, lay down areas, equipment, and vehicle parking shall be reviewed with and approved by the Owner and civil engineer. None of these items shall be stored in places that create an obstruction to traffic or airfield operations. Climate conditioning for stored materials shall be the responsibility of the Contractor.

17. Security

The Contractor shall be responsible for the security of the project site, including its equipment and materials, as well as the security of the equipment and materials of its agents and Subcontractors.

The Contractor shall provide the Owner or its designated agent a list of all his employees as well as a list of all the employees of his Subcontractors and shall, during the work of the project, advise such designated agent of changes to the list of personnel working on the project. The Contractor shall be responsible for the direct supervision of his employees, those of his agents and Subcontractors at all times while on the project site.

The Contractor shall exercise and take all precautions in the storage and dispensing of all flammable liquids such as, but not limited to, gasoline, fuel, and lubricants.

18. Motorized Vehicles

The Contractor shall be responsible for the actions of his employees, agents, and Subcontractors. Personnel who do not abide by the applicable rules and regulations shall be subject to prosecution.

All motorized vehicles and equipment operating on the project site and anywhere else on the Airport shall not exceed a speed of 15 mph, and all aircraft shall have priority over all motorized vehicles and equipment.

19. De-Watering During Construction

If needed, the Contractor shall provide de-watering during construction. All work shall be coordinated with and approved by the civil engineer.

20. Conflicts

In the event of conflict between these bid documents and other laws, rules, or regulations or other state, or local agencies, the more restrictive laws, rules, or regulations shall apply. The CONTRACTOR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved

END OF SPECIAL PROVISIONS

SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Blue Ridge Regional Airport Terminal - Bid Documents
- B. Owner's Name: Blue Ridge Regional Airport
- C. Architect's Name: Price Studios, LLC (dba PSH+).
- D. The project scope is a replacement terminal building project for the Blue Ridge Regional Airport (MTV) located near Martinsville, Virginia. The project scope is based on new construction of a single story General Aviation Terminal building approximately 7,800 GSF in size.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in the Instructions to Bidders.

1.03 WORK BY OWNER

- A. Owner will award a contract for construction of the adjacent site work and parking lot which will be awarded and conducted generally concurrent with the terminal building project.

1.04 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
 - 2. Limit disturbance to adjacent paved surfaces
 - 3. Notify owner when equipment great than 25'-0" will be used in construction.
 - 4. Coordinate work with the site work Contractor and civil engineer.
- B. Arrange use of site and premises to allow:
 - 1. Work by Others.
 - 2. Work by Owner.
- C. Provide access to and from site as required by law and by Owner:

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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.
- D. Existing building spaces may not be used for storage.
- E. Time Restrictions:
1. Limit conduct of especially noisy exterior work to the hours of 8am to 6pm
- F. Utility Outages and Shutdown:
1. Prevent accidental disruption of utility services to other facilities.

1.06 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner and the Owner's site work Contractor.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	01 10 00 - 2	Summary

SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

- A. Form to be used: AIA G703.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum or \$200,000, whichever is less.
- F. Provide a separate line item for each Allowance specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
- G. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Form to be used: AIA G702 and G703.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:

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1. Item Number.
 2. Description of work.
 3. Scheduled Values.
 4. Previous Applications.
 5. Work in Place and Stored Materials under this Application.
 6. Authorized Change Orders.
 7. Total Completed and Stored to Date of Application.
 8. Percentage of Completion.
 9. Balance to Finish.
 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, itemizing each proposed change order separately, listing Change Order and Proposed Change Order numbers and dollar amounts as for an original item of Work.
- I. Submit three copies of each Application for Payment. If approved by the owner, electronic Applications for Payment in PDF file format will be accepted in lieu of three paper copies.
- J. Include the following with the application:
1. Transmittal letter as specified for submittals in Section 01 30 00.
 2. Construction progress schedule, revised and current as specified in Section 01 32 16.
 3. Partial release of liens from major subcontractors and vendors.
 4. Affidavits attesting to off-site stored products.
- K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.04 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

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- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change . Contractor shall prepare and submit a fixed price quotation within 10 days.
- D. Contractor may propose a change by submitting a request for change to Architect and Owner describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation . Document any requested substitutions in accordance with Section 01 60 00.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 - 1. For change requested by Contractor, the amount will be based on the Contractor's proposed Change Order as approved by Architect and Owner.
 - 2. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
 - 3. For change ordered by Owner and Architect without a quotation from Contractor, the amount will be determined and approved by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- F. Substantiation of Costs: Provide full information required for evaluation.
 - 1. On request, provide the following data:
 - a. Quantities
 - 1) Material quantities and unit prices (separated into trades; include sales tax).
 - b. Labor costs (raw cost).
 - c. Labor burden, applied to labor only, including but not limited to, worker's compensation and public liability, social security tax, old age and unemployment insurance, union welfare fund and fringe benefits. Contractor shall be required to substantiate the labor burden percentage applied to any change in contract amount. Labor burden percentage shall not exceed 30% in any case.
 - d. Construction equipment cost.
 - e. Taxes, insurance, and bonds.
 - f. Overhead and profit combined (on Claims for net increase only), as defined in Section 7.3.11.
 - g. Cost of Premiums for Bonds (for Contractor only). Evidence of additional premium for bond shall be submitted with Claim.
 - h. Extended Overhead Costs (if applicable) which shall be established by pro-rating the value of supervision, temporary facility, and General Conditions and all other direct

and indirect costs of Contractor included in the Contract Sum over the number of days included in the Contract Time.

- i. Justification for any change in Contract Time, showing impact on critical path tasks.
 - j. Credit for deletions from Contract, similarly documented.
 2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- G. Execution of Change Orders: Contractor will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order with proposed change orders itemized as separate line items and adjust the Contract Sum.
- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

1.05 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 70 00.
 2. Acceptance of Closeout Submittals specified in 01 78 00..

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	01 20 00 - 4	Price and Payment Procedures

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 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.

1.03 REFERENCE STANDARDS

- A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage); Current Edition.
- B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

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.
 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. A Substitution Request for specified installer constitutes a representation that the submitter:
1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. 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.
- D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
- E. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period, and the documents required.
- B. Submittal Form (before award of contract):
1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
 2. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute, including drawings, cuts, performance and test data and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute will require shall be included in the request. The burden of proof of the acceptability of the proposed substitution shall be upon the party proposing the substitution. The Architect's decision to approve or disapprove a proposed substitution shall be final.
 3. By making requests for substitutions, the Contractor:

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- a.
 - b. Represents that the Contractor will provide the same warranty of the substitution that it would for that specified.
 - c. Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign cost, and waives all claims for additional costs related to the substitutions which subsequently become apparent.
 - d.
- B. Architect will consider requests for substitutions only within 15 days after date of Agreement ,unless provisions for substitutions are stipulated in the instructions to bidders.
 - C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
 - D. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
 - 1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
 - 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
 - 3. Bear the costs engendered by proposed substitution of:
 - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
 - b. Other unanticipated project considerations.
 - E. Substitutions will not be considered under one or more of the following circumstances:
 - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
 - 2. Without a separate written request.
 - 3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to making a recommendation to the owner. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.

3.05 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.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - 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

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SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Construction progress schedule.
- G. Contractor's daily reports.
- H. Progress photographs.
- I. Coordination drawings.
- J. Submittals for review, information, and project closeout.
- K. Number of copies of submittals.
- L. Requests for Information (RFI) procedures.
- M. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 00 42 50 - Electronic File Release Agreement.
- B. Section 01 60 00 - Product Requirements: General product requirements.
- C. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
- D. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 REFERENCE STANDARDS

- A. AIA G716 - Request for Information; 2004.
- B. AIA G810 - Transmittal Letter; 2001.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

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B. Make the following types of submittals to Architect:

1. Requests for Information (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. 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 Information (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. 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.
1. Representatives of Owner are scheduled and included in this training.
- D. 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 PRECONSTRUCTION MEETING

- A. Schedule meeting within (10) days after receipt of the Notice to Proceed.
- B. Attendance Required:
1. Owner.
 2. Architect.
 3. Contractor.
- C. 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. Submission of initial Submittal schedule.
 6. Designation of personnel representing the parties to Contract.
 7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 8. Scheduling.
- D. 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.

3.03 SITE MOBILIZATION MEETING

- A. Schedule meeting at the Project site prior to Contractor occupancy.
- B. May be combined with Preconstruction Meeting.
- C. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
- D. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Application for payment procedures.
 - 9. Procedures for testing.
 - 10. Procedures for maintaining record documents.
 - 11. Requirements for start-up of equipment.
 - 12. Inspection and acceptance of equipment put into service during construction period.
- 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 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals; unless stipulated otherwise in the General Conditions.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

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C. Attendance Required:

1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.

D. Agenda: As defined in the general conditions.

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. Provide a log of open submittals @ each meeting.
6. Review of RFIs log and status of responses. Provide a log of RFIs.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

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

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

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1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. In addition to transmitting electronically a copy to Owner and Architect, submit two printed copies at weekly intervals.
 1. Submit in format acceptable to Owner.
- C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 1. Date.
 2. High and low temperatures, and general weather conditions.
 3. List of subcontractors at Project site.
 4. List of separate contractors at Project site.
 5. Approximate count of personnel at Project site.
 6. Major equipment at Project site.
 7. Material deliveries.
 8. Safety, environmental, or industrial relations incidents.
 9. Meetings and significant decisions.
 10. Unusual events (submit a separate special report).
 11. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
 15. Change Orders received and implemented.
 16. Testing and/or inspections performed.

17. List of verbal instruction given by Owner and/or Architect.
18. Signature of Contractor's authorized representative.

3.07 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- C. Photography Type: Digital; electronic files.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
 1. Completion of site clearing.
 2. Excavations in progress.
 3. Foundations in progress and upon completion.
 4. Structural framing in progress and upon completion.
 5. Enclosure of building, upon completion.
- E. Views:
 1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
 5. Point of View Sketch: Provide sketch identifying point of view of each photograph.

3.08 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.

3.09 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the

same space (interference); or when an item of work is described differently at more than one place in Contract Documents.

2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 2. Prepare in a format and with content acceptable to Owner.
 - a. Use AIA G716 - Request for Information or approved equivalent.
 3. Prepare using software provided by the Electronic Document Submittal Service.
 4. Combine RFI and its attachments into a single electronic PDF file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 2. Owner's, Architect's, and Contractor's names.

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3. Discrete and consecutive RFI number, and descriptive subject/title.
 4. Issue date, and requested reply date.
 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 2. Note dates of when each request is made, and when a response is received.
 3. Highlight items requiring priority or expedited response.
 4. Highlight items for which a timely response has not been received to date.
 5. Remove improper or frivolous RFIs.
- G. Review Time: Architect will respond and return RFIs to Contractor within 10 business days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.

3.10 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.

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2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
 - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.11 SUBMITTALS FOR REVIEW

- A. Provide a submittal schedule at project start. Key and coordinate submittal schedule to project schedule.
- B. 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.
- C. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- D. Samples will be reviewed for aesthetic, color, or finish selection.
- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.12 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 1. Design data.
 2. Sustainability design submittals and reports.
 3. Certificates.
 4. Test reports.
 5. Inspection reports.

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6. Manufacturer's instructions.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.13 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- C. Submit for Owner's benefit during and after project completion.

3.14 NUMBER OF COPIES OF SUBMITTALS

- 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.
1. Transmit PDFs to the Architect by email or file transfer hub, not via link to contractor website.
 2. Combine transmittal for the submittal and all of its attachments into a single electronic, PDF.
- B. Samples: Submit three samples; one of which will be retained by Architect.
1. Identify all samples using alpha-numeric tag shown in finish selections.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.15 SUBMITTAL PROCEDURES

- A. General Requirements:
1. Use a separate transmittal for each item.
 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 3. Transmit using approved form.
 - a. Use Form AIA G810 or approved equal.

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4. Sequentially number each submittal beginning with applicable specification section followed by sequential numbers. Revise submittals with original number and a sequential alphabetic suffix.
 - a. Example: 079100-01
5. Sequentially identify each item. For revised submittals use original number and a sequential alphabetical suffix.
 - a. Example 079100-01A
6. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
7. 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.
8. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 10 business 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 business 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. Cloud all changes to shop drawings that are being re-submitted.
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.
15. Maintain a copy of all submittals and samples bearing the Architect's review stamp at the job site.

B. Product Data Procedures:

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1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Submit concurrently with related shop drawing submittal.
 4. 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. Use of the Contract Documents in digital form to create shop drawings is only permitted as defined in Section 00 42 50 - Electronic File Release Agreement.
 4. 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. Acceptance of submittals does not constitute acceptance of deviations from the Contract Documents unless the deviations have been clearly identified as such in the submittal.
- F. Approval Stamp: stamp each submittal with a uniform approval stamp. Include project name, location, submittal number, specification section title and number, name of reviewer, date of Contractor's approval and statement certifying that submittal has been reviewed, checked and approved for compliance with Contract Documents.
- G. Product Data: Clearly mark all product data to indicate specific models, features, functions, options, sizes, etc. applicable to the project.

3.16 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information or Record: Architect will not acknowledge receipt, and take no other action.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:

1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "NO EXCEPTION TAKEN".
 - b. "MAKE CORRECTIONS NOTED".
2. Not Authorizing fabrication, delivery, and installation:
 - a. "REVISE AND RESUBMIT".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - 2) Non-responsive resubmittals may be rejected.
 - b. "REJECTED".
 - 1) Submit item complying with requirements of Contract Documents.

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.
- C. Construction progress schedule, with network analysis diagrams and reports.

1.02 REFERENCE STANDARDS

1.03 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. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.
- F. Submit in PDF format.
- G. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.04 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.
- B. Contractor's Administrative Personnel: 3 years minimum experience in using and monitoring CPM schedules on comparable projects.

1.05 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. Diagram Sheet Size: Maximum 22 x 17 inches.
- C. Scale and Spacing: To allow for notations and revisions.

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PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a preliminary network diagram.

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 and name.
- 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 pre-installation 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 based on installation dates required by construction schedule. Indicate decision dates for selection of finishes.
- H. Where applicable, indicate delivery dates for owner-furnished products.
- I. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.
- J. Indicate dates for punch list and substantial completion.
- K. Where applicable, indicate dates for installation of equipment by owner's vendor.
- L. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

- A. Allowable for projects with a contract value less than \$1,500,000.
- B. Include a separate bar for each major portion of Work or operation.
- C. Identify the first work day of each week.

3.04 NETWORK ANALYSIS

- A. Required for projects with a contract value greater than \$1,500,000.
- B. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

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- C. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.
- D. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
 - 1. Preceding and following event numbers.
 - 2. Activity description.
 - 3. Estimated duration of activity, in maximum 15 day intervals.
 - 4. Earliest start date.
 - 5. Earliest finish date.
 - 6. Actual start date.
 - 7. Actual finish date.
 - 8. Latest start date.
 - 9. Latest finish date.
 - 10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
 - 11. Monetary value of activity, keyed to Schedule of Values.
 - 12. Percentage of activity completed.
 - 13. Responsibility.
- E. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and recomputation of all dates and float.
- F. Required Reports: List activities in sorts or groups:
 - 1. By preceding work item or event number from lowest to highest.
 - 2. By amount of float, then in order of early start.
 - 3. Listing of activities on the critical path.

3.05 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.

3.06 UPDATING SCHEDULE

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

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- 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.
- H. Update the schedule monthly, submit with each pay application.

3.07 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. Distribute schedule as a PDF via e-mail.
- C. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 40 05 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. References and standards.
- B. Quality assurance.
- C. Mock-ups.
- D. Control of installation.
- E. Tolerances.
- F. Testing and inspection agencies and services.
- G. Control of installation.
- H. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

1.03 REFERENCE STANDARDS

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

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

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 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Integrated Exterior Mock-ups: construct integrated exterior mock-up as indicated on Drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
- D. Notify Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.
- E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

- F. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- G. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- H. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
 - 1. Architect will issue written comments within five (5) working days of initial review and each subsequent follow up review of each mock-up.
 - 2. Make corrections as necessary until Architect's approval is issued.
- I. Accepted mock-ups shall be a comparison standard for the remaining Work.
- J. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.
- K. Where possible salvage and recycle the demolished mock-up materials.

3.03 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.

3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. 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.
- C. 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. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.05 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 of 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.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 42 16 - DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Approved: When used to convey Architect's action on applications and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- B. Directed: A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- C. Furnish: To supply, deliver to the site, unload, and inspect for damage.
- D. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- F. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- G. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
- H. Project Site: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which the project is to be built.
- I. Provide: To furnish and install, complete and ready for beneficial use.
- J. Regulations: Laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction and rules, conventions and agreements within the construction industry that control performance of the work.
- K. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dewatering
- B. Temporary utilities.
- C. Temporary telecommunications services.
- D. Temporary sanitary facilities.
- E. Temporary Controls: Barriers, enclosures, and fencing.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Project identification sign.
- J. Field offices.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.03 DEWATERING

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. Coordinate all work with the civil engineer.

1.04 TEMPORARY UTILITIES

- A. Owner will provide the following:
 - 1. Electrical power and metering, consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.
- B. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- C. Existing facilities may be used.
- D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

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1.05 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Mobile data "smart phone" with email for the Contractor's project manager and site superintendent.

1.06 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.

1.07 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. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 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.

1.09 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 the civil engineer 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 shall not be used for construction traffic unless specifically indicated.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- G. Existing parking areas may be used for construction parking where directed by Owner.

- H. Do not allow vehicle parking on existing pavement.

1.10 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. 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.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location indicated.
- C. Provide project identification sign of design, construction, and location approved by Owner.
- D. No other signs are allowed without Owner permission except those required by law.

1.12 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture.
- B. Provide space for Project meetings, with table and chairs to accommodate 8 persons.
- C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.13 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. Grade site as indicated.
- 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 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- B. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.
- C. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

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.

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PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 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 using or containing CFC's or HCFC's.
 - 2. Containing lead, cadmium, or asbestos.
- C. Where other criteria are met, Contractor shall give preference to products that:
 - 1. If used on interior, have lower emissions, as defined in Section 01 61 16.
 - 2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
 - 3. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 4. Have longer documented life span under normal use.
 - 5. Result in less construction waste. See Section 01 74 19
 - 6. Are made of vegetable materials that are rapidly renewable.
 - 7. Are made of recycled materials.
 - 8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
 - 9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
 - 10. Are Cradle-to-Cradle Certified.
 - 11. Have a published Environmental Product Declaration (EPD).
 - 12. Have a published Health Product Declaration (HPD).
 - 13. Have a published Manufacturer's Inventory of Chemical Content.

2.03 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.

2.04 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. See Section 01 25 00 - Substitution Procedures.

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 74 19.
- 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

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2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	01 60 00 - 6	Product Requirements

SECTION 01 70 00 - 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. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.
- C. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.
- D. Section 01 50 00 - Temporary Facilities and Controls: Temporary interior partitions.
- E. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- F. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- G. Section 07 84 00 - Firestopping.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.

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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. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

- D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

- 1. Pest Control Service: Monthly treatments.

1.06 COORDINATION

- A. See Section 01 10 00 for occupancy-related requirements.
- B. 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.
- C. Notify affected utility companies and comply with their requirements.
- D. 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.
- E. 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.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. 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 60 00 - 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.

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- 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 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Contractor shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.

- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- K. Periodically verify layouts by same means.
- L. Maintain a complete and accurate log of control and survey work as it progresses.
- M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. 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.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 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:

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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 original 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 84 00, to full thickness of the penetrated element.
- I. Patching:
1. 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.
 2. Match color, texture, and appearance.
 3. 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.

3.07 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.

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- 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.

3.08 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. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- G. 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.
- H. Prohibit traffic from landscaped areas.
- I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. 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.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 - Demonstration and Training.

3.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

3.12 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- 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. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- J. Clean Owner-occupied areas of work.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

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- 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. Owner will occupy portions of the building as specified in Section 01 10 00.
- F. 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.
- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Accompany Project Coordinator on Contractor's preliminary final inspection.
- I. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- J. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.14 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

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SECTION 01 78 00 - 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. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- 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.
- B. 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 two sets of revised final documents in final form within 10 days after final inspection.
- C. 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.

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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 Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.
 - 6. Remove or conceal all professional seals except those of parties responsible for delegated design performed under the Contractor's scope of work.
 - 7. Provide complete index of drawings on cover page with sheets listed in correct order.

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8. Label sheets as "Record Drawings" with date of completed preparation.

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.

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. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers of uniform color; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings organized into volumes.

- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. 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.
- G. 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.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
 - 1. Project Directory.
 - 2. Table of Contents, of all volumes, and of this volume.
 - 3. Operation and Maintenance Data: Arranged by system, then by product category.
 - a. Source data.
 - b. Product data, shop drawings, and other submittals.
 - c. Operation and maintenance data.
 - d. Field quality control data.
 - e. Photocopies of warranties and bonds.
 - 4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

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.

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- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

3.07 MAINTENANCE MATERIALS

- A. Provide as required in individual Sections asn Section 01 60 00
- B. Deliver in unopened with labels indicating contents.
- C. Delivery time and location shall be determined by Owner

END OF SECTION

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SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Conveying systems.
 - 6. Landscape irrigation.
 - 7. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Fixtures and fittings.
 - 4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.
- B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures; except:
- B. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.

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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.
4. Include Commissioning Authority's formal acceptance of training session when applicable.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.

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. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. 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. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- C. Provide training in minimum two hour segments.
- D. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms when applicable.

- E. 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.
- F. 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.
- G. 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.

END OF SECTION

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SECTION 03 05 16 - UNDERSLAB VAPOR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

- A. ACI 302.2R-06 Guide for Concrete Slabs that receive Moisture-Sensitive Flooring Materials
- B. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- C. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Test Data: Submit report of tests showing compliance with paragraph 9.3 of ASTM E1745.
 - 1. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
- D. Samples: Submit samples of underslab vapor barrier to be used.
- E. Manufacturer's Installation Instructions: Indicate installation procedures for placement, seaming, penetration repair and perimeter seal with adjacent construction per ASTM E1643.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Underslab Vapor Barrier:
 - 1. Water Vapor Permeance: Not more than 0.010 perms, maximum as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1.
 - 2. Complying with ASTM E1745 Class A.
 - 3. Thickness: 15 mils.
 - 4. Manufacturers:

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- a. Basis of Design: Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.
 - b. Griffolyn Green 15 by Reef Industries.
 - c. Fortifiber Moistop Ultra 15-mil.
 - d. Substitutions: Reference specification section 01 25 00 - Substitution Procedures.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, termination bars etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ensure that subsoil is level, compact and approved prior to commencing work.

3.02 EXAMINATION

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.03 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
- D. Extend the vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (1) at a point acceptable to the structural engineer or (2) where obstructed by impediments, such as dowls, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
 - 1. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw per the manufacturer's instructions.
 - 2. Seal vapor barrier to the entire perimeter wall or footing / grade beam with double sided tape or termination bar and tape per the manufacturer's instructions. Ensure that the concrete is clean and dry prior to adhering tape.
- E. Lap joints minimum 6 inches and seal with the manufacturer's seam tape. Apply tape to a clean and dry vapor barrier only.
- F. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

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- G. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities. Avoid the use of non-permanent stakes driven through the vapor barrier.
- H. Repair damaged vapor retarder with vapor barrier material of equal or better permeance, puncture and tensile qualities. Repair before covering with other materials.

END OF SECTION

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SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place concrete formwork, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories and form-facing materials
- D. Form stripping and removal

1.02 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).
- C. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials and Commentary; 2010 (Reapproved 2015).
- D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- E. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- F. ASME A17.1 - Safety Code for Elevators and Escalators; 2019.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- H. PS 1 - Structural Plywood; 2009.

1.04 PRE-INSTALLATION MEETINGS

- A. Meet at project site prior to beginning of installation to review the following:
 - 1. Special inspector and testing/inspection agency procedures for field quality control.
 - 2. Construction, movement, contraction, and isolation joints.
 - 3. Forms and form-removal limitations.
 - 4. Shoring and reshoring procedures.

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5. Anchor rod and anchor device installation tolerances.

1.05 SUBMITTALS

- A. Product Data: Provide data on form materials and installation requirements to include form liners, form ties, waterstops and form-release agents.
- B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties. Shop drawings prepared by, and signed and seal by, a qualified professional engineer responsible for their preparation.

1.06 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.
 1. Failure to clearly indicate revisions with clouds and revision date.
 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.07 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.
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- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.
- B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.
- C. Protect plastic foam products from damage and exposure to sunlight.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions. Provide the largest practicable sizes to minimize the number of joints.
- C. Chamfer outside corners of beams, joists, columns, and walls.
- D. Comply with applicable code and design requirements with respect to design, fabrication, erection, and removal of formwork to support vertical, lateral, static and dynamic loads, and construction loads that might be applied, until the structure can support such loads.
 - 1. Design formwork to limit deflection of form-facing material to L/240 of center-to-center spacing of supports.
- E. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301. Design wood panel forms in accordance with APA's Concrete Forming Design/Construction Guide.

2.02 WOOD FORM MATERIALS

- A. Exterior-grade plywood panels, suitable for plywood forms, complying with DOS PS 1 and as follows:
 - 1. APA HDO (high-density overlay)
 - 2. APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
 - 3. APA Structural I Plyform, B-B or better, mill oiled and edge sealed.
 - 4. APA Plyform Class I, B-B or better; mill oiled and edge sealed.

2.03 REMOVABLE PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gauge, 0.0598 inch thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Preformed Aluminum Forms: ASTM B221 (ASTM B221M), 6061-T6 alloy, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

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- C. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- D. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

2.04 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
 - 1. Formulate form-release agents with rust inhibitor for steel form-facing materials.
 - 2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- C. Filler Strips for Chamfered Corners: Wood, metal, PVC or rubber type; 3/4" x 3/4" minimum size, maximum possible lengths.
- D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- E. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping without hammering or prying against concrete surfaces. Do not damage concrete during stripping. Provide keyways, reglets, recesses, and other accessories, for easy removal. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
- D. Do not use rust-stained, steel, form-facing material.

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- E. Align joints and make watertight. Keep form joints to a minimum. At exposed concrete locations, symmetrically align joints in forms.
- F. Construction and Movement Joints
 - 1. At construction joints, overlap forms onto previously placed concrete not less than 12".
 - 2. Construct joints true to line with faces perpendicular to surface plane of concrete.
 - 3. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 4. Place joints perpendicular to main reinforcement.
- G. Obtain approval before framing openings in structural members that are not indicated on drawings.
- H. Limit concrete surface irregularities as follows:
 - 1. ACI 301 Surface Finish-2.0: ACI 117 Class B Surface: 1/4 in allowable in 5 ft. Applicable at all exposed concrete surfaces.
 - 2. ACI 301 Surface Finish-1.0: ACI 117 Class D Surface: 1 in allowable in 5 ft. Applicable at surfaces to be permanently concealed.

3.03 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- B. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
- C. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- D. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms, at inconspicuous locations, to allow flushing water to drain.
- E. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.05 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms, clean surfaces, remove fins and laitance, and tighten to close joints. Split, frayed, delaminated, or other-wise damaged form-facing material are unacceptable for exposed surfaces.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.06 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated, and to comply with the Surface Finish designations specified in Section 033000 Cast-In-Place for as-cast finishes and Section 033300 Architectural Concrete.
- B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.07 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
 - 1. Formwork for sides of beams, walls, columns and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

3.08 FIELD QUALITY CONTROL

- A. The Owner will engage an independent special inspector and qualified testing agency to perform field quality control tests and special inspections of the following:
 - 1. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
 - 2. Verification of concrete strength before removal of shores and forms from beams and slabs.

END OF SECTION

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SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories.
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI MNL-66 - ACI Detailing Manual; 2020.
- C. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- F. CRSI (DA4) - Manual of Standard Practice; 2009.

1.04 PRE-INSTALLATION MEETINGS

- A. Meet at project site prior to beginning installation to review the following:
 - 1. Special inspector and testing/inspection agency procedures for field quality control.
 - 2. Steel-reinforcing installation.
 - 3. Construction contraction and isolation joints.

1.05 SUBMITTALS

- A. Shop Drawings: Comply with requirements of ACI MNL-66 Include bar schedules, shapes of bent bars, spacing of bars, and location of splices. Indicate proposed construction joints required to build the structure.
- B. Reports: Submit certified copies of mill test report of reinforcement materials analysis.
- C. Product Data: Bar supports and rebar splicing/coupler systems.

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1.06 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
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1.07 REQUESTS FOR INFORMATION (RFI) PROCEDURES

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- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.08 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.

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- B. Steel Welded Wire Reinforcement (WWR): Plain type; ASTM A1064/A1064M.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

2.02 RE-BAR SPLICING/COUPLER SYSTEMS:

- A. Coupler Systems: Mechanical devices for splicing reinforcing bars.
 - 1. Comply with ACI CODE-318 steel reinforcing design strength requirements for splices in tension and compression.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4)- Manual of Standard Practice.
- B. Locate reinforcing splices not indicated on drawings at point of minimum stress.
 - 1. Review locations of splices with Architect.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- E. Comply with ACI 318 for concrete cover over reinforcement.
- F. Set wire ties with ends directed into concrete, not towards exposed concrete surfaces.
- G. Install weld-wire-fabric reinforcement in longest practical lengths.
 - 1. Continuous support spacing not to exceed 12 inches.
 - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches.

3.02 FIELD QUALITY CONTROL

- A. The Owner will engage an independent special inspector and qualified inspection agency to perform field quality control tests and special inspections of the following:
 - 1. Inspect installed reinforcement and mechanical rebar-splicing/coupler devices for compliance with contract documents before concrete placement.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floors and slabs on grade.
- B. Concrete foundation walls and footings.
- C. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 20 00 - Concrete Reinforcing.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.
- C. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- E. ACI PRC-305 - Guide to Hot Weather Concreting; 2020.
- F. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.
- G. ACI PRC-308 - Guide to External Curing of Concrete; 2016.
- H. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials and Commentary; 2010 (Reapproved 2015).
- I. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- K. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- L. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2012.
- M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

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- N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2020.
- O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2020.
- P. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2020a.
- Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.
- S. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- T. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- U. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
- V. ASTM C476 - Standard Specification for Grout for Masonry; 2019.
- W. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.
- X. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements; 2025.
- Y. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- Z. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2015.
- AA. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars; 2014.
- BB. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; 2010a (Reapproved 2015).
- CC. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method); 2023.
- DD. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2019.
- EE. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- FF. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- GG. ASTM E1155/E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2023.

- HH. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- II. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 - 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
 - 2. For membrane-forming, moisture emission-reducing, curing and sealing compound, provide manufacturer's installation instructions.
- B. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate intended location within Project for each proposed mix design to include the the appropriate Exposure Class designation.
 - 2. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
 - 3. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
 - 4. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
- C. Test Reports: Submit report for each test or series of tests specified.

1.05 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
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- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

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- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.07 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
- B. Follow recommendations of ACI PRC-305 when concreting during hot weather.
- C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal or Type II - Moderate. ASTM C150/C150M, Type III High-Early Strength may be used for cold weather construction.
 - 1. Acquire cement for entire project from same source.
- B. Blended Cement: ASTM C595/C595M, Type IL. Portland Limestone cement.
- C. Fine and Coarse Aggregates: ASTM C33/C33M.
 - 1. Acquire aggregates for entire project from same source.
 - 2. Alkali-Silica Reaction: For all concrete designated as Exposure Classification W1 and W2, requirements for the evaluation of the potential for alkali-aggregate reactivity must be mitigated in accordance with ASTM C1778. Perform aggregate testing in accordance with ASTM C1260 Accelerated Mortar Bar Test.
 - a. If test results indicate less than 0.10% expansion after 14 days immersion, the aggregate is considered to be innocuous and can be used with no further testing.

- b. If test results indicate 0.10% or more expansion after 14 days immersion, the aggregate shall be further tested in accordance with ASTM C1293 Concrete Prism Test.
 - 1) If test results indicate less than 0.04% expansion after one year, the aggregate is considered non-reactive and can be used with no further testing.
 - 2) If test results indicate 0.04% or more expansion after one year, the aggregate is considered to be potentially deleteriously reactive and shall not be used unless Alkali Silica Reactive Preventative Measures are taken (ref. ASTM C1778 Sections 8 & 9).
- 3. Maximum Coarse Aggregate Size: 1 inch nominal, typical. Provide 3/8" maximum aggregate size for concrete toppings less than 3 inch thick.
- D. Fly Ash: ASTM C618, Class F.
- E. Slag Cement: ASTM C989/C989M, proportion in accordance with ACI PRC-233.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- G. Synthetic Fibrillated Micro-Fiber Reinforcement: ASTM C1116/C1116M, Type III.
 - 1. Fiber Length: 1/2 to 1 1/2 inches nominal.
 - 2. Fiber Type: Alkali-resistant synthetic
 - a. Products:
 - 1) Euclid Chemical Company; PSI Fiberstrand F: www.euclidchemical.com/#sle.
 - 2) Sika Fibermesh; Fibermesh 300: www.fibermesh.com/#sle.
 - 3) GCP Applied Technologies; Grace Microfiber: www.gcpat.com/#sle.

2.02 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement. Do not use calcium chloride or admixtures containing calcium chloride.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- F. Retarding Admixture: ASTM C494/C494M Type B.
- G. Water Reducing Admixture: ASTM C494/C494M Type A.

2.03 ACCESSORY MATERIALS

A. Underslab Vapor Barrier:

1. Sheet Material: ASTM E1745, Class A, not less than 15 mils thick; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.
2. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.04 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:

1. Complying with ASTM C881/C881M and of Type required for specific application to include Types IV and V minimum, load-bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.05 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

1. Application: Use this product at all locations where Curing and Sealing Compounds are not required.
2. Product dissipates within 4 to 6 weeks.

B. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.

1. Application: Use at exposed interior slabs, including parking garage slabs.
2. Vehicle: Water-based.
3. Solids by Mass: 25 percent, minimum.
4. VOC Content: OTC compliant.

C. Moisture-Retaining Sheet: ASTM C171.

1. Curing paper, regular.
2. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.
3. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

D. Water: Potable, not detrimental to concrete.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

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- B. Concrete Mixes: Comply with the durability/exposure classification, weight, minimum strength, maximum water-cement ratio and air content requirements provided in the Structural Construction Documents.
 - 1. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
 - a. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
 - 2. Cement content: not less than indicated in ACI 301.
 - 3. Slump: The contractor's mix designer shall determine the appropriate slump for each type of concrete. Slump tolerances shall comply with ACI 117.
- C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.
 - 1. Air Entrainment: All exterior exposed concrete shall include air-entrainment admixture.
- D. Micro-Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 - 1. Use epoxy bonding system.

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- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- F. Interior Slabs on Grade: Install vapor barrier under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor barrier before covering.
 - 1. Vapor Barrier Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.
- G. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI PRC-304.
- B. Place concrete for floor slabs in accordance with ACI PRC-302.1.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor bond break material to prevent movement during concrete placement.

- C. Isolation Joints: Install wherever necessary to separate slab from other building members, including columns, wall, equipment foundations, footings, stairs, and other locations as indicated. Use polyethylene.
 - 1. Extend bond-breaking polyethylene strips full weight and depth of joint, terminating flush with finish concrete surface unless otherwise indicated on drawings.
 - 2. Terminate bond-breaking polyethylene strips not less than 1/2 in or more than 1 inch below finish concrete surface, where joint sealants are indicated.
 - 3. Install bond-breaking polyethylene strips in lengths as long as practicable.
- D. Load Transfer Construction and Contraction Joints: Install joint dowel bars and support assemblies at joints where indicated on drawings. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- E. Saw Cut Contraction/Control Joints in Slabs-on-Ground: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; cut 1/8 in wide by at least 1 inch deep but not less than one quarter (1/4) the depth of the slab. Saw cutting joints should not tear, abrade, or otherwise damage surface and should begin before concrete develops random cracks.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 - 1. Typical Slabs-on Ground: F(F) of 25; F(L) of 20.

3.07 CONCRETE FINISHING

- A. Form Finishes: Provide finish as follows:
 - 1. ACI 301 Surface Finish-1.0 (SF-1.0): Applicable at surfaces permanently concealed.
 - a. No form-facing material is specified.
 - b. Patch voids larger than 1 3/4 in wide or 1/2 in deep.
 - c. Remove projections larger than 1 in.
 - d. Tie holes need not be patched.
 - e. Surface tolerance Class D as specified in ACI 117.
 - f. Mockup not required.
 - 2. ACI 301 Surface Finish-2.0 (SF-2.0): Applicable at all exposed concrete surfaces.
 - a. Use form-facing material.
 - b. Patch voids larger than 3/4 in wide or 1/2 in deep.
 - c. Remove projections larger than 1/4 in.
 - d. Patch tie holes.

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- e. Surface tolerance Class B as specified in ACI 117.
 - f. Unless otherwise specified, provide mockup of concrete surface appearance and texture.
- B. Concrete Floors and Slabs: Finish to requirements of ACI PRC-302.1, meeting ACI 117 tolerances and the Floor Flatness and Levelness tolerances specified. Unless indicated on Drawings, provide the following finishes:
- 1. Scratch finish - for surfaces intended to receive bonded cementitious mixtures.
 - 2. Float finish - for walks, drives, steps, ramps and for surfaces intended to receive waterproofing, roofing, insulation, or sand-bed terrazzo.
 - 3. Trowel finish - for floors intended as walking surfaces, floors in manufacturing, storage, and warehousing areas, or floors that will receive floor coverings.
 - 4. Broom finish - for exterior concrete platforms, steps, ramps and locations indicated on Drawings. Coordinate final finish with Architect before application.

3.08 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling in:
- 1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 - 2. Mix, place, and cure concrete, as specified, to blend in with in-place construction.
 - 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Equipment Bases and Foundations:
- 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend bases not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 3500 psi at 28 days.
 - 4. Install headed anchors to connect concrete base to concrete floor. Unless otherwise indicated, install headed anchors at 16 inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

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- b. Cast anchor-rods inserts into bases.
- c. Install anchor rods to elevations required for proper attachment to supported equipment.

3.09 CURING AND PROTECTION

- A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 1. Comply with ACI PRC-305 for Hot Weather protection during curing.
 - a. Maintain moisture loss no more than 0.2 lb/sq. ft x h before and during finishing operations.
 - 2. Comply with ACI PRC-306 for Cold Weather protection during curing.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than seven days.
 - 2. High early strength concrete: Not less than four days.
- C. Curing Methods
 - 1. Ponding, continuous fogging, or continuous sprinkling.
 - 2. Application of mats or fabric kept continuously wet.
 - 3. Continuous application of steam.
 - 4. Application of sheet materials conforming to ASTM C171.
 - 5. Application of curing compound conforming to ASTM C309 or ASTM C1315.
 - a. The contractor shall be responsible for removing any traces of the dissipating curing compound ASTM C309 that remains on the concrete surface prior to application of adhesive-applied flooring or any type of bonded application.
 - b. Only use curing and sealing compound ASTM C1315 on surfaces where sealed concrete is the finished surface.
- D. Curing Formed Concrete Surfaces:
 - 1. Keep absorbent wood forms wet until they are removed.
 - 2. As soon as forms can be loosened without damage to concrete, water should be applied to the top of the form and allowed to run down the interface between the form and new concrete until forms are fully removed.
 - 3. After form removal, formed surfaces, including underside of beams, supported slabs and other similar surfaces, should be cured for remainder of curing period by one of the listed methods.

E. Curing Unformed Concrete Surfaces

1. After placement and finishing of concrete surfaces, apply one of the listed curing methods.

F. Curing Floor to receive Polished Concrete Finish.

1. After placement and finish of concrete surfaces, apply one of the following curing methods:
 - a. Ponding, continuous fogging, or continuous sprinkling.
 - b. Application of mats or fabric kept continuously wet.

3.10 FIELD QUALITY CONTROL

A. The owner will engage an independent special inspector and qualified testing agency to perform field quality control tests and special inspections of the following:

1. Inspect cast-in-place anchor installation, to included headed anchor rods and embed plates, for compliance with contract documents before concrete placement.
2. Inspect post-installed anchor installation to verify conformance with manufacturer's installation instructions.
3. Verify use of required design mix for placement location.
4. Inspect, sample and test materials and concrete production. When it appears that material furnished or work performed fails to conform to Contract Documents, the testing agency will immediately report such deficiency to Architect/Engineer, Owner, Contractor and Concrete Supplier.
5. Testing agency will report test and inspection results of the work to Owner, Architect/Engineer, Contractor and concrete supplier within 7 days after tests and inspections are performed. Strength test reports to include location in the Work where the concrete represented by each test was deposited, date and time sample was obtained, and batch ticket. Strength test reports to include detailed information of storage and curing of specimens before testing.
6. Contractor to provide space and electrical power on the project site for facilities to be used for initial curing of concrete test specimens. Testing agency to be responsible for providing curing container for test specimens on site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
7. For each concrete mixture on the project placed in any one day, obtain samples of fresh concrete in accordance with ASTM C172, selected on a random basis.
 - a. Testing Frequency: Obtain one composite sample for each day's pour of each mixture exceeding 5 cu yd, but less than 25 cu yd, plus one set for each additional 50 cu yd or fraction thereof. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

- b. Slump: ASTM C143/C143M: One test at truck (as delivered) for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
- c. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for lightweight concrete: one test for each composite sample, but not less than one test for each day's pour of each concrete mixture
- d. Concrete Temperature: ASTM C1064/C1064M: one test for each composite sample.
- e. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete: one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- f. Compression Test Specimens: ASTM C31/C31M: Samples shall be taken from concrete pump discharge hose when concrete is transported by concrete pump.
 - 1) Cast and laboratory cure one set of six 4-in by 8-in cylinder specimens for each composite sample. Cast additional cylinder specimens as required to satisfy OSHA requirements
- g. Compressive Strength Tests: ASTM C39/C39M: Test one set of two laboratory-cured specimens at 7 days and one set of three specimens at 28 days. Test one specimen at 56 days if required.
 - 1) Concrete strengths for acceptance shall be the average of at least three 4-in by 8-in cylinders tested at 28 days.
 - 2) Strength level of concrete mixture shall be acceptable if both are satisfied:
 - (a) Every average of any three consecutive strength tests equals or exceeds f'_c .
 - (b) No strength test falls below f'_c by more than 500 psi if f'_c is 5000 psi or less; or by more than $0.10 \times f'_c$ if f'_c exceeds 5000 psi.
- h. Nondestructive tests for uniformity: use of the rebound hammer in accordance with ASTM C805 or the pulse-velocity method in accordance with ASTM C597 may be permitted by Architect/Engineer to evaluate uniformity of in-place concrete or to select areas to be cored. These methods shall not be used to evaluate in-place strength.
- i. Testing agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strength, or other requirements have not been met, as directed by Architect.
- j. If concrete strength is in doubt or when required by Contract Documents, the testing agency shall obtain cores, prepared and tested in accordance with ASTM C42/C42M.
- k. Additional testing and inspecting required to demonstrate compliance with Contract Documents will be at the Contractor's expense.

8. Verify maintenance of specified curing temperatures and techniques.
9. Measure floor and slab flatness and levelness in accordance with ASTM E1155/E1155M within 72 hours of completion of floor finishing and before removal of supporting formwork or shoring (if applicable) and properly report test results to Architect. Report both composite overall values and local values for each measured section.
 - a. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than $F(F) 13 / F(L) 10$.
 - b. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- B. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
- C. Repair Mortar: Mix dry-pack repair mortar, consisting of 1 part portland cement to 2 1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing. Alternatively, acceptable commercial repair products may be used for repairs - use in accordance with manufacturer's instructions.
- D. Partially Exposed Reinforcement: The surface of partially exposed reinforcement where exposed less than or equal to half the reinforcement bar size shall be clean of all detritus material. Where reinforcement is exposed more than half the reinforcement bar size, concrete shall be removed around the entire circumference of the reinforcement plus 3/4 inch and the reinforcement shall be clean of all detritus material.
- E. Repairing Formed Surfaces: Surface defects including color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projects on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, remove fins and cut out honeycombs, rock pockets, and voids that exceed ACI 301 Surface Finish requirements back to solid concrete.
 - a. Limit cut depth to 1/2 inch.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact the patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on exposed concrete surfaces by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect/Engineer.
- F. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface. Test surfaces sloped to drain for trueness of slope and smoothness.
1. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. Correct high areas by grinding, after concrete has cured at least 14 days. Depth of removal shall not exceed 1/4 inch without scanning the affected area to verify required concrete cover will be maintained.
 3. Correct localized low areas 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.
 4. Correct other low areas scheduled to receive floor coverings with Self-Leveling Cementitious Concrete Floor Underlayment. Feather edges to match adjacent floor elevations.
 5. Correct other low areas that are scheduled to be left exposed with Architectural Concrete Floor Topping Overlayment. Feather edges to match adjacent floor elevations.
- G. Structural Repairs of Concrete: subject to Architect/Engineer's approval, using epoxy adhesives and patching mortar.

3.12 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.
- B. Maintain concrete protection to prevent freezing of the concrete and to ensure necessary strength development for structural safety.

END OF SECTION

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SECTION 03 45 00 - PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural precast concrete wall caps & window sills.
- B. Architectural precast concrete accessories.
- C. Supports, anchors, and attachments.
- D. Grouting under panels.

1.02 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- B. ACI 303 - Standard Specification for Cast-In-Place Architectural Concrete
- C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- F. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- H. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- I. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
- J. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- K. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2007.
- L. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; 2010, Seventh Edition.
- M. PCI MNL-122 - Architectural Precast Concrete; 2007, Third Edition.
- N. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988, Second Edition.
- O. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

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1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.
- C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials.
 - 1. Include details of mix designs.
 - 2. Include structural design calculations.
- D. Samples: Submit two concrete samples, 4 x 4 inch in size, illustrating surface finish, color and texture.
- E. Designer's Qualification Statement.
- F. Maintenance Data: Indicate surface cleaning instructions.

1.05 QUALITY ASSURANCE

- A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.
- B. Fabricator Qualifications:
 - 1. Firm having at least 5 years of documented experience in production of precast concrete of the type required.

1.06 MOCK-UP

- A. Provide mock-up units for a typical window and a wall cap. Include anchorage points and finish matching the approved sample.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handling: Lift and support precast units only from support points.
- B. Blocking and Lateral Support During Transport and Storage: Use materials that are clean, non-staining, and non-harmful to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

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- C. Protect units to prevent staining, chipping, or spalling of concrete.
- D. Mark units with date of production in location that will be concealed after installation.

PART 2 PRODUCTS

2.01 PRECAST UNITS, GENERAL

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
 - 1. Concrete: Minimum 5000 psi, 28 day strength, air entrained to 4 to 6 percent; comply with ACI 301 and ACI 303.
 - a. Backup Mix not allowed. Cast units solid with one concrete mix.
 - 2. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
 - 3. Calculate structural properties of units in accordance with ACI 318.
 - 4. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - 5. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
 - 6. Units shall be made by the 'wet pour' process. Dry Tamp method is not acceptable.
- B. Finish Type A: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.
 - 1. Texture: Light acid wash
 - 2. Color: As indicated on drawings

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
 - 1. Deformed billet-steel bars.
 - 2. Galvanized in accordance with ASTM A767/A767M, Class I. Galvanize after fabrication.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal White Portland type.
- B. Aggregates: Natural white stone particles to match the machine honed finish sample selected..
- C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

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- D. Admixtures: ASTM C494. Calcium Chloride shall not be used.

2.04 SUPPORT DEVICES

- A. Connecting and Support Devices; Anchors and Inserts: ASTM A666 Type 304 stainless steel.
 - 1. Clean surfaces of rust, scale, grease, and foreign matter.
- B. Dowels: Type 304 stainless steel.
- C. Threaded type concrete inserts: ASTM A 47 or ASTM A27; galvanized.

2.05 FABRICATION

- A. Mix concrete in compliance with PCI MNL-117 and requirements of this section..
- B. Place concrete in a continuous operation to prevent seams or planes of weakness from developing in precast units. Comply with requirements of MNL-117 for measuring, mixing, transporting, and placing concrete. Fabricate units by the "Wet Pour" process; the "Dry Tamp" fabrication method will not be accepted.
- C. Concrete mixing and measurement: ASTM C 94.
- D. Maintain plant records and quality control program during production of precast units. Make records available upon request.
- E. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
- F. Maintain consistent quality during manufacture.
- G. Fabricate connecting devices, plates, angles, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.
- H. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.
- I. Place concrete within a temperature range between 50 and 90 degrees.
- J. Deposit concrete continuously into forms to prevent formation of planes of weakness in units.
- K. Consolidate concrete to prevent segregation and to produce a dense concrete, free of honey combs.
- L. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- M. Identification: Mark each unit to correlate with approved shop drawings. Do not locate markings on finished surfaces.
- N. Finishes:
 - 1. Exposed to View: Provide a smooth, machined honed finish on all sides.
 - 2. Concealed: Form or troweled surface.

- O. Curing: Maintain units in a damp environment until concrete attains 60% of design strength.
- P. Outside Corners: Provide 1" Quirk Mitre.

2.06 FABRICATION TOLERANCES

- A. Comply with PCI MNL-117 and PCI MNL-135, except as specifically amended below.
 - 1. Maximum Variation From Nominal Face Dimensions: Plus or minus 1/8 in.
 - 2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
 - 3. Maximum Variation from Thickness: Plus or minus 1/8 in.
 - 4. Maximum Misalignment of Anchors, Inserts, Openings: Plus or minus 1/2 inch.

2.07 SOURCE QUALITY CONTROL

- A. Provide testing and analysis of concrete mix.
- B. Take one air entrainment test cylinders for each set of exterior concrete test cylinders taken.
- C. Take water absorption test in accordance with PCI MNL-117.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.02 PREPARATION

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 ERECTION

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.
- E. Fasten units in place with mechanical connections.
- F. Touch-up field welds and scratched or damaged primed painted surfaces.
- G. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers. Pack grout to base of unit.
- H. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.

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- I. Anchor units per approved shop drawings.

3.04 TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.
 - 1. Plan Location from Building Grid Datum: Plus or minus 3/8 in.
 - 2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
 - 3. Exposed Joint Dimension: Plus or minus 3/16 inch.
 - 4. Differential Bowing or Camber as Erected Between Similar Adjacent Members: Plus or minus 1/4 inch.

3.05 JOINTS

- A. At all precast joints and joints between pre-cast and other materials, seal joints with sealant specified in section 07 92 00 - Sealants.

3.06 CLEANING

- A. Clean after installation is complete.
- B. Use detergent, SUR-clean, and ample water, using a brush to scrub clean.

3.07 PROTECTION

- A. Protect installed wall caps and window sills from subsequent construction operations and staining.

END OF SECTION

SECTION 04 01 00 - MAINTENANCE OF MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water cleaning of masonry surfaces.
- B. Repointing mortar joints.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Mortar and grout.
- B. Section 04 43 13 - Stone Masonry Veneer.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
 - 1. Require attendance of parties directly affecting work of this section.
 - 2. Review conditions of installation, installation procedures, and coordination with related work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on cleaning compounds.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
 - 1. Maintain one copy of each document on project site.
- B. Restorer: Company specializing in masonry restoration with minimum three years of documented experience.

1.07 MOCK-UP

- A. Restore and repoint an existing masonry wall area sized 8 feet long by 6 feet high; include in mock-up area instances of mortar, accessories, wall openings, and flashings.
- B. Clean a 10 ft by 10 ft panel of wall to determine extent of cleaning.
- C. Locate where directed.
- D. Acceptable panel and procedures employed will become the standard for work of this section.

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1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.
- B. Store blast medium materials in manufacturer's packaging.

1.09 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

- A. Cleaning Agent: Detergent type.

2.02 MORTAR MATERIALS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces to be cleaned are ready for work of this section.

3.02 PREPARATION

- A. Protect surrounding elements from damage due to restoration procedures.
- B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.
- C. Separate areas to be protected from restoration areas using means adequate to prevent damage.
- D. Interior masonry shall be cleaned prior to the installation of interior finish materials.
- E. Cover existing landscaping with tarpaulins or similar covers.
- F. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.
- G. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.
- H. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.
- I. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 REPOINTING

- A. Perform repointing prior to cleaning masonry surfaces.
- B. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.
- C. Use hand tools only. Do not use power tools.
- D. Do not damage masonry units.
- E. When cutting is complete, remove dust and loose material by brushing.
- F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.
- G. Moist cure for 72 hours.

3.04 CLEANING EXISTING MASONRY

3.05 CLEANING NEW MASONRY

- A. Verify mortar is fully set and cured.
- B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
- C. Scrub walls with cleaning agent solution using stiff brush. Thoroughly rinse and wash off cleaning solution, dirt and mortar crumbs using clean, pressurized water.
- D. Protect area below cleaning operation and keep masonry soaked with water and flushed free of acid and dissolved mortar continuously for duration of cleaning.
- E. Before solution dries, rinse and remove acid solution and dissolved mortar, using clean, pressurized water.
- F. Interior masonry shall be cleaned prior to the installation of interior finish materials.

3.06 CLEANING

- A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.
- B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.
- C. Clean surrounding surfaces.
- D. Interior masonry shall be cleaned prior to the installation of in

END OF SECTION

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SECTION 04 26 13 - MASONRY VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Clay facing brick.
- C. Hollow brick.
- D. Mortar and grout.
- E. Reinforcement and anchorage.
- F. Flashings.
- G. Installation of lintels.
- H. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Steel stud backup for masonry veneer.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- C. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016, with Editorial Revision (2018).
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2015b.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019 (Reapproved 2025).
- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- C. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.
- D. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.

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- E. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2017.
- F. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- G. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2019.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.
- I. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- J. ASTM C476 - Standard Specification for Grout for Masonry; 2019.
- K. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- M. BIA Technical Notes No. 28B - Brick Veneer/Cold-Formed Steel Framed Walls; 2025.
- N. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- O. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.
- P. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.
- C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
 - 1. Maintain one copy of each document on project site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 MOCK-UP

- A. Construct a masonry wall as a mock-up panel as shown in the bid documents; include mortar and accessories and structural backup in mock-up.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.09 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
 - 1. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates.
 - 2. Remove and replace unit masonry damaged by frost or by freezing conditions.
 - 3. Use liquid cleaning methods only when air temperature is 40 degrees F and higher and will remain so until masonry has dried.

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 non-standard blocks configured for corners.
 - a. Provide bullnose units for outside corners.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - a. Hollow block, as indicated.
 - 4. Non-Loadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
 - b. Lightweight.

2.02 BRICK UNITS

- A. Manufacturers:
 - 1. Endicott Clay Products Co; _____: www.endicott.com/#sle.
 - 2. As scheduled on the drawings.
- B. Facing Brick: ASTM C216, Type FBA, Grade SW.
 - 1. Color and Texture:
 - a. Color: Sienna Ironspot
 - b. Texture: Artisan
 - 2. Nominal Size: Utility Size.
 - a. Utility Size, 3-5/8 inches (92.1 mm) deep, 3-5/8 inches (92.1 mm) high, 11-5/8 inches (295.3 mm) long.
 - 3. Special Shapes: Molded units as required by conditions indicated. Do not miter bricks at corners, provide special shapes instead.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M Type N.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Grout Aggregate: ASTM C404.
- E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color(s): As selected by Architect from manufacturer's full range.
- F. Water: Clean and potable.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) yield strength, deformed billet bars; galvanized.
- B. Joint Reinforcement Type: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Joint Reinforcement Standard: ASTM A951/A951M.
 - 1. Type: Truss or ladder.

2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
 3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- D. 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.
1. Anchor plates: Not less than 0.075 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.
 2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
 3. Vertical adjustment: Not less than 3-1/2 inches.

2.05 FLASHINGS

- A. Metal Flashing Materials: Stainless Steel, as specified in Section 07 62 00.
- B. 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.
- C. Stainless Steel/Polymer Fabric Drainage Plane Flashing - Self-Adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet with 8 mil of butyl adhesive and a removable release liner on one side and a sheet of non-woven drainage material bonded to the other side.
- D. Factory-Fabricated Flashing Corners and Ends: Stainless steel.
- E. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- F. Drip Edge: Stainless steel; compatible with membrane and adhesives.

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Weeps:
 1. Type: Preformed aluminum vents with sloping louvers.
 2. Color(s): As selected by Architect from manufacturer's full range.
- C. Cavity Vents: Molded PVC grilles, insect resistant.
 1. Type: Molded PVC grilles, insect resistant.
 2. Color(s): As selected by Architect from manufacturer's full range.
- D. Drainage Fabric: Polyester mesh bonded to a water and vapor-permeable fabric.

- E. 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.
- F. 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, Proportion Specification.
 - 1. Masonry below grade and in contact with earth; Type S.
 - 2. Exterior, non-loadbearing masonry; Type N.
 - 3. Interior, non-loadbearing masonry; Type O.
- 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 as required to fill volumes completely 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. Verify compliance with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- E. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- F. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.02 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: As indicated for different locations.
 2. Coursing: As indicated on the drawings.
 3. Mortar Joints: Concave.

3.03 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 as work progresses.
- E. Interlock intersections and external corners, except for units laid in stack bond.
- 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. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.
- I. Do not miter any bricks at corners. Use special shapes instead.

3.04 WEEPS/CAVITY VENTS

- A. Install weeps in veneer 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 walls at 32 inches on center horizontally below shelf angles and lintels and at top of walls.

3.05 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.

3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. 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. 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.

3.07 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 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 behind water-resistive barrier sheet over backing.
 2. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
 3. Terminate vertical leg of flashing into bed joint in masonry or reglet in concrete.

4. Anchor vertical leg of flashing into backing with a termination bar and sealant.
 5. 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 through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
 - E. Support flexible flashings across gaps and openings.
 - F. Extend plastic, laminated, and EPDM flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
 - G. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.08 LINTELS

- A. Install loose steel lintels over openings.
- B. Maintain minimum 8 inch bearing on each side of opening.

3.09 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- D. Form expansion joint as detailed on drawings.

3.10 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- 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.

3.11 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

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- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Lintels.
- E. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016, with Editorial Revision (2018).
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- C. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.
- D. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2019.
- E. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2020.
- F. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.
- I. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- J. ASTM C476 - Standard Specification for Grout for Masonry; 2019.
- K. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2019.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- M. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2016.

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N. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.03 SUBMITTALS

- A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- B. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
- C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

1.04 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.
 - 1. Failure to clearly indicate revisions with clouds and revision date.
 - 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.05 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.
- C. Submit RFIs only for clarification or interpretation of the Contract Documents. RFIs shall include a list of sheets, plans, sections, details, and specifications in the Contract Documents where the Contractor has already looked for the information being requested.
- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.

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- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

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.
 - a. Provide bullnose units for outside corners.
 - 3. Load-Bearing and Non-Load-Bearing Units: ASTM C90, lightweight.
 - a. Hollow block, as indicated.
 - b. Exposed Faces: Manufacturer's standard color and texture where indicated.

2.02 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
 - 1. Not more than 0.60 percent alkali.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.
- F. Accelerating Admixture: Nonchloride type for use in cold weather.

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- G. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type S.
 - 2. Color: Standard gray.
- H. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.
- B. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Ladder.
 - 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
 - 3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- C. 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. 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 A153/A153M, Class B.

2.04 ACCESSORIES

- A. Preformed Control Joints: Polyvinyl chloride material. Provide with corner and tee accessories, fused joints.
- B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.05 LINTELS

- A. Site-Cast Bond Beam Lintels: Built in place lintels comprised of bond beam units matching adjacent CMU in texture, color, and density. Place reinforcing bars in lintels and fill with grout; provide temporary shoring of lintels until grout has cured.

2.06 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 S.
 - 2. Exterior, loadbearing masonry: Type S.
 - 3. Exterior, non-loadbearing masonry: Type S.

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4. Interior, loadbearing masonry: Type S.
 5. Interior, non-loadbearing masonry: Type S.
- B. 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.
 - C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
 - 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.

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.

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.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

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- 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.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 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.

3.07 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHER MASONRY, AND CAVITY WALL 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. 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 24 inches horizontally and 16 inches vertically.
- G. 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.

3.08 LINTELS

- A. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

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1. Do not splice reinforcing bars.
2. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
3. Place and consolidate grout fill without displacing reinforcing.
4. Allow masonry lintels to attain specified strength before removing temporary supports.

3.09 GROUTED COMPONENTS

- A. Lap splices as indicated on Drawings.
- 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.

3.10 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation from Alignment of Columns: 1/4 inch.
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.11 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 FIELD QUALITY CONTROL

- A. Special Inspector and Independent Testing Agency: Owner will engage a qualified Special Inspector and Independent Testing Agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at the Contractor's expense.
- B. Inspections: Special Inspections in accordance with Level 2 in TMS 402.
 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of size, spacing and grades of reinforcing steel.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5,000 sq. ft. of wall area or portion thereof.
- E. Finish: Hot-dip zinc coating where indicated to be galvanized on Drawings.
- F. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- G. Mortar Tests (Proportion Specification): Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.
- H. Grout Tests (Compressive Strength): For each mix provided, in accordance with ASTM C1019.
- I. The Owner's Special Inspector and Independent Testing Agency shall inspect the masonry construction during various work stages for compliance with the project Drawings and Specifications, and keep records of the following:
1. Quality and testing of masonry units.
 2. Proportioning, mixing, and consistency of mortar and grout. Laying, mortaring and grouting of masonry units and elements.
 3. Condition, grade, size, spacing, and placement of reinforcing.
 4. Any significant or unusual construction loads on masonry structural elements.
 5. General progress of the work.
 6. When ambient temperatures fall below 40 degrees F or rises above 100 degrees F, a complete record shall be maintained of weather conditions and of the preconditioning and protection given to masonry materials and protection and curing of completed work.
 7. Inspection records shall be furnished to the Building Official, Owner and Architect/Engineer during progress of the work.
 8. The inspector shall not supervise the construction; however, they shall visit the project with the frequency necessary to observe the various stages of the work and length of time at each visit to ascertain that it is being done in compliance with the Contract Documents and code requirements.
- J. Evaluation of Quality Control Tests and Inspections: In the absence of other indications of non-compliance with requirements, masonry will be considered satisfactory if results from construction quality control tests and inspections comply with the minimum requirements indicated.

3.13 CLEANING AND REPAIRING

- 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.
- E. Remove and replace CMUs that are damaged, loose, or stained and do not match adjacent units. Install replacement units with fresh mortar and repoint joints to eliminate perception of unit replacement.

3.14 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

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SECTION 04 43 00 - STONE MASONRY VENEER

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Stone masonry anchored to cold-formed metal framing and sheathing.

B. Related Requirements:

1. Section 061600, "Sheathing" for sheathing used with Anchored Stone Masonry Veneer.

1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product.

- B. Samples for Initial Selection: For colored mortar and other items involving color selection.

- C. Samples for Verification:

1. For each stone type indicated. Include at least five Samples in each set and show the full range of color and other visual characteristics in completed Work.
2. For each color of mortar required. Label Samples to indicate types and amounts of pigments used.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, supply sources, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.

1. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents contained in mockups unless Architect approves such deviations in writing.

- C. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous three years.

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2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.
- B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 1. Build mockup of typical wall area in location as directed by Architect.
 2. Build mockups for each type of stone masonry in minimum sizes approximately 96 inches long by 144 inches high by full thickness, including face and backup wythes and accessories.
 3. Protect accepted mockups from the elements with weather-resistant membrane.
 4. Obtain architect's acceptance of sample panel before beginning construction activities of this section.
 5. Do not remove sample panel until construction activities of this section have been accepted by the Architect.
 6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 7. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 PRECONSTRUCTION TESTING

- A. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

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- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.08 FIELD CONDITIONS

- A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter using coverings spread on the ground and over the wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1.09 COORDINATION

- A. Advise installers of adjacent Work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.
- B. Coordinate locations of dovetail slots installed in concrete that are to receive stone anchors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design. Subject to compliance with requirements provide Adair - Limestone by Arriscraft:
 - 1. Cultured Limestone.

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- a. Georgian Blend
 - b. Blue/Grey Veined
- B. Source Limitations for Stone: Obtain stone from single manufacturer, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

2.02 STONE VENEER

- A. Dolomitic Limestone: to ASTM C568, Category III – High-Density; special shapes as indicated; having the following typical average properties when tested to the identified standard:
 - 1. Material Standards:
 - a. Compressive Strength: 22,900 psi, to ASTM C170
 - b. Maximum Absorption in accordance with ASTM C97/C97M: 7.5 percent.
 - c. Density: 167 lb.ft³, to ASTM C97
 - d. Modulus of Rupture: 2,250 psi, to ASTM C99
 - e. Flexural Strength: 1,600 psi, to ASTM C880
 - f. Abrasion Resistance: 18.0, to ASTM C241
- B. Fabricated Units:
 - 1. Modular Sizes:
 - a. APM358: 3-5/8" high, 3-5/8" bed, various lengths up to 35-5/8".
 - b. APM758: 7-5/8" high, 3-5/8" bed, various lengths up to 35-5/8".
 - c. APM1158: 11-5/8" high, 3-5/8" bed, various lengths up to 35-5/8".
 - 2. Texture: Split finish on exposed faces [and ends]
 - 3. Color & Pattern: Georgian Blend - Blue/Grey Veined, fleuried pattern, to match approved sample range.
 - 4. Coursing. Random coursed bond pattern.
- C. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

2.03 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.
 - 1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
 - 1. Color as selected by Architect.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in stone masonry mortar.
- E. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix produces color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments do not exceed 10 percent of portland cement by weight.
- F. Aggregate: ASTM C144 and as follows:
 - 1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
 - 2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
 - a. Color as selected by Architect.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- H. Water: Potable.

2.04 VENEER ANCHORS

- A. Materials:
 - 1. Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M; with ASTM A153/A153M, Class B-2.
 - 2. Stainless Steel Wire: ASTM A580/A580M, Type 304.
 - 3. Hot-Dip Galvanized-Steel Sheet: ASTM A1008/A1008M, cold-rolled, carbon-steel sheet, hot-dip galvanized after fabrication to comply with ASTM A153/A153M, Class B-2.

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4. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- B. Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inch cover on exterior face.
 - C. Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch diameter, hot-dip galvanized steel wire.
 1. Ties are bent in the form of loops with legs not less than 15 inches in length and with last 2 inches bent at 90 degrees.
 2. Ties are bent in the form of rectangular loops with ends bent downward for inserting into eyes projecting from masonry joint reinforcement specified in Section 042000 "Unit Masonry."
 3. Ties are bent in the form of triangular loops designed to be attached to masonry joint reinforcement specified in Section 042000 "Unit Masonry" with vertical wires passing through ties and through eyes projecting from masonry joint reinforcement.
 - D. Stainless Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless steel shank, complying with ASTM C954, except manufactured with hex washer head and neoprene washer, No. 10 by length required to penetrate steel-stud flange with not less than three exposed threads.
 - E. Polymer-Coated, Steel Tapping Screws for Concrete Masonry: Self-tapping screws with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, 3/16-inch diameter by 1-1/2-inch length, and with organic polymer coating with more than 800-hour, salt-spray resistance to red rust in accordance with ASTM B117.

2.05 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 1. Stainless Steel: ASTM A240/A240M, Type 304, 0.016 inch thick.
 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
 3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
 4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
 5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 6. Fabricate through-wall flashing with sealant stop where indicated. Fabricate by bending metal back on itself 3/4 inch at exterior wall face and down into joint 3/8 inch to form a stop for retaining sealant backer rod.

7. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 8. Metal Sealant Stops: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior wall face. At exterior wall face, bend metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.
 9. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.
- B. Flexible Flashing: For flashing unexposed to the exterior, use the following unless otherwise indicated:
1. Stainless steel core with polymer fabric laminated to one stainless steel face with non-asphaltic adhesive.
 - a. Basis-of-Design: Hohmann & Barnard: Mighty-Flash SA
 - b. Stainless steel: Type 304, ASTM A240
 - c. Puncture resistance: 2,500 psi, ASTM E154
 - d. Tensile: 100,000+ ASTM D412.
 - e. Fabric: Polymer fabric; laminated back face (non-exposed side) of stainless-steel core.
 - f. Clear adhesive factory laminated to Polymer fabric.
 2. Size: Manufacturer's standard width rolls.
 3. Accessories: Stainless steel drip plate.
- C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
 2. Where flashing is indicated to be turned down at or beyond wall face, use metal flashing.
 3. Where flashing is partly exposed and is indicated to terminate at wall face, use metal flashing with a drip edge.
 4. Where flashing is fully concealed, use flexible flashing.
- D. Sealants for Sheet Metal and Flexible Flashings:
1. Subject to compliance with requirements provide York Flashing; UniverSeal US100.
 - a. Type: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920-11, Type S, Grade NS, Class 50.
- E. Adhesives, Primers, and Seam Tapes for Flexible Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.06 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.
- B. Weep/Vent Products:
 - 1. Vinyl Weep Holes/Vents: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into head joint and consisting of louvered vertical
 - a. leg, flexible wings to seal against ends of stone units, and top flap to keep mortar out of head joint; in color approved by Architect to match that of mortar.
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
- D. Outside corner and inside corner material; manufacturer's standard available units
- E. End dam: Product may be folded in line with the flashing material or utilize preformed end dams by manufacturer.
- F. Splice material: Manufacturer's standard self-adhered metal material; material matching system material.
- G. Termination bar: Manufacturer's standard 1" composite material bar or a 1" 26 gauge stainless steel termination bar with sealant lip.

2.07 FABRICATION

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
- B. Cut or select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings and pattern specified in "Setting Stone Masonry" Article.
 - 1. Shape stone specified to be laid in pattern indicated with sawed beds.
- C. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.
- D. Thickness of Stone: Provide thickness indicated, but not less than the following:
 - 1. Thickness: 4 inches plus or minus 1/4 inch.
- E. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.
 - 1. Clean sawed backs of stone to remove rust stains and iron particles.

2.08 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride.
 - 2. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - 3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp,
 - a. unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
- B. Mortar for Stone Masonry: Comply with ASTM C270, Proportion Specification.
 - 1. Mortar for Setting Stone: Type N.
 - 2. Mortar for Pointing Stone: Type N.
- C. Pigmented Mortar: Use colored cement product.
 - 1. Pigments do not exceed 10 percent of portland cement by weight.
 - 2. Pigments do not exceed 5 percent of mortar cement by weight.
 - 3. Mix to match Architect's sample.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary.
 - 1. Mix to match Architect's sample.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.
- B. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.
- C. Examine wall framing, sheathing, and weather-resistant sheathing paper to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.

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- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.
- B. Coat concrete and unit masonry backup with asphalt dampproofing.
- C. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear
 - 1. water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.03 INSTALLATION OF STONE MASONRY

- A. Perform necessary field cutting and trimming as stone is set.
 - 1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
 - 2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
- D. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place.
- E. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- F. Install steel lintels where indicated. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
- G. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any.
- H. Provide sealant joints of widths and at locations indicated.
- I. at locations indicated.
 - 1. Keep sealant joints free of mortar and other rigid materials.
 - 2. Sealant joints are specified in Section 079200 "Joint Sealants."

- J. Install metal expansion strips in sealant joints at locations indicated. Build flanges of expansion strips into masonry by embedding in mortar between stone masonry and backup wythe. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
- K. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- L. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
- M. Install vents in head joints at top of each continuous cavity at spacing indicated.

3.04 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
- C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.
- D. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
- F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.05 INSTALLATION OF ANCHORED STONE MASONRY

- A. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement by inserting pintles into eyes of masonry joint reinforcement projecting from unit masonry.
- B. Anchor stone masonry to stud framing with screw-attached veneer anchors unless otherwise indicated.
- C. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inch cover on exterior face.
- D. Space anchors to provide not less than one anchor per 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.
- E. Anchor stone trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide

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compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.

- F. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.
- G. Provide cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.
 - 1. Slope beds toward cavity to minimize mortar protrusions into cavity.
- H. Rake out joints for pointing with mortar to depth of not less than 1/2 inch before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.06 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the joint profile as indicated by Architect.

3.07 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective joints.
 - 3. Stone masonry not matching approved samples and mockups.
 - 4. Stone masonry not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.

3. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.
4. Interior masonrys hall be cleaned prior to the installation of interior finishes.

3.08 EXCESS MATERIALS AND WASTE

- A. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
 1. Crush masonry waste to less than 4 inches in greatest dimension.
 2. Mix masonry waste with at least 2 parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

STAPART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members.
- B. Structural steel support members and struts.
- C. Base plates.
- D. Grouting under base plates.
- E. Stainless steel rod cross bracing and connectors.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 13 - Architecturally-Exposed Structural Steel Framing: Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).
- B. Section 05 21 00 - Steel Joist Framing.
- C. Section 05 31 00 - Steel Decking: Field installation of steel shear studs connectors through deck.

1.03 DEFINITIONS

- A. Structural Steel - Structural frame members indicated on the Drawings and defined by AISC 303.

1.04 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2017.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- C. AISC 360 - Specification for Structural Steel Buildings; 2016.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- F. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2018.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2018.
- I. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.

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- J. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2018.
- K. 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.
- L. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- M. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2017.
- N. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2019.
- O. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.
- P. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2018.
- Q. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- R. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- S. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- T. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- U. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with Errata (2015).
- V. SSPC-SP 3 - Power Tool Cleaning; 2024.

1.05 COORDINATION

- A. Coordinate selection of shop primers with subsequent paint topcoats to ensure compatibility. Comply with all manufacturer's written recommendations.
- B. Coordinate installation of anchor rods, bearing plates and other anchorage items embedded into other construction without delaying the work of other trades. Provide shop drawings with detailed layout information, setting diagrams, and installation instructions.

1.06 PRE-INSTALLATION MEETING

- A. Pre-installation conference - Hold conference on site with virtual attendance option.

1.07 SUBMITTALS

- A. Product Data and Product Test Reports

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1. Structural steel materials.
 2. Bolt-nut-washer assemblies.
 3. Anchor rods.
 4. Shrinkage-resistant grout.
 5. Shop primer.
- B. Shop Drawings:
1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 2. Connections.
 3. Indicate cambers.
 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
 5. Indicate bolt type, size, and length. Include requirements for pre-tensioned and slip-critical connections.
 6. Include items embedded in other construction.
 7. Identify surface preparation and shop primer.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports:
- E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.
- F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M.
- G. Fabricator's Qualification Statement.
- H. Erector's Qualification Statement.
- I. Paint Compatibility Certificates: From topcoat manufacturers certifying that topcoats are compatible with shop primers.
- J. Source Quality Control Reports: Including ultrasonic testing of complete-joint-penetration welds performed at the fabricator's shop.
- K. Certificate of Compliance: The approved fabricator shall submit a certificate of compliance to the AHJ stating that the materials supplied and work performed by the fabricator are in accordance with the Construction Documents.
- L. Field Quality Control Reports.

1.08 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.
 - 1. Failure to clearly indicate revisions with clouds and revision date.
 - 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.09 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.
- C. Submit RFIs only for clarification or interpretation of the Contract Documents. RFIs shall include a list of sheets, plans, sections, details, and specifications in the Contract Documents where the Contractor has already looked for the information being requested.
- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.10 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN)"Steel Construction Manual."
- B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 12 13.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M.
- D. Fabricator Qualifications: Fabricator shall participate in a Quality Certification Program audited by an independent third party. Use one of the two following compliance paths.

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1. AISC-Certified Plant, Category BU
 2. Independent inspection and quality control agency: Fabricator shall employ a qualified independent testing and inspection agency to conduct periodic in-plant inspections of the fabricator's plant. Inspections shall be at a frequency required to assure the fabricator's conformance with the requirements of the inspection agency's approved quality assurance program as required by the Building Code.
- E. Erector Qualifications: Installer shall participate in a Quality Certification Program audited by an independent third party. Use one of the two following compliance paths.
1. AISC Certified Erector, Category CSE
 2. Independent inspection and quality control agency: Erector shall employ a qualified independent testing and inspection agency to conduct periodic field inspections of the erector's work. Inspections shall be at a frequency required to assure the erector's conformance with the requirements of the inspection agency's approved quality assurance program as required by the Building Code.
- F. Fabricator and Erector Quality Certification Programs shall adhere to the minimum requirements of AISC 360, Chapter N.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Store steel members off the ground using supports and spacers. Protect steel members from corrosion.
- B. Store fasteners in sealed containers with visible manufacturer's identifying label.
1. Clean and re-lubricate snug-tightened bolts that become dry or rusty.
 2. Clean and re-lubricate tension-control bolts that become dry or rusty in conformance with written manufacturer's instructions. Re-test bolt assemblies after cleaning and relubrication per manufacturer's instructions.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with the following standards and specifications:
1. AISC 303.
 2. AISC 360.
 3. RCSC's "Specifications for Structural Joints Using High-Strength Bolts".
- B. Connection Design:
1. AISC Option 1: Connection designs have been completed and required connections are indicated on the Drawings.

2.02 MATERIALS

- A. Steel W-Shapes, Channels and WT-Shapes: ASTM A992/A992M.
- B. Steel Angles, S-Shapes, Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- C. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade C.
- D. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
 - 1. Finish: Plain
 - 2. Finish: Hot-dip zinc coating where indicated to be galvanized on Drawings.
- E. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.
 - 1. Finish: Plain.
 - 2. Finish: Hot-dip zinc coating where indicated to be galvanized on Drawings.
- F. Headed Anchor Rods: ASTM F1554 Grade 36, Grade 55 (Weldable), and Grade 105 as indicated on the Drawings.
 - 1. Nuts: ASTM A563 heavy-hex.
 - 2. Plate Washers: ASTM A36.
 - 3. Washers: ASTM F436, Type 1
 - 4. Finish: Plain unless indicated to be hot-dip galvanized on the Drawings.
- G. Stainless Steel Rods and Connectors by STA-LOK
 - 1. Satin brushed finish.
 - 2. 5/8" diameter rods.
 - 3. SC clevis system.
 - 4. Cross coupler at rod interstecion.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

- J. Shop and Touch-Up Primer: Fabricator's standard lead-free and chromate-free, rust-inhibiting primer compatible with topcoat. Primer shall comply with VOC limitations of authorities having jurisdiction.
- K. Touch-Up Primer for Galvanized Surfaces: ASTM A780.

2.03 FABRICATION

- A. Shop fabricate structural steel to greatest extent possible in accordance with AISC 303 and AISC 360.
 - 1. Develop required camber for members.
 - 2. Fabricate steel beams and girders with mill rolling camber pointing upwards.
 - 3. Mark and match-mark materials for field erection.
- B. Thermal Cutting: Use machines to greatest extent possible. Plane thermally cut edges to be welded per requirements of AWS D1.1.
- C. Mill Finishing: Provide at ends of columns and other members transmitting bearing forces.
- D. Bolt Holes: Punch, drill, or mechanically thermally cut holes. Where field access for nut tightening is limited, tack weld nuts to members to receive field bolt.
- E. Bolted Connections: Shop connections using high-strength bolts shall adhere to RCSC's "Specification for Structural Joints Using High-Strength Bolts".
- F. Welded Connections: Shop welded connections shall adhere to AWS D1.1 and AWS D1.8 and maintain tolerances is AISC 303 for mill material.

2.04 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 3.
- B. Where indicated, galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.
 - 1. Unless noted to remain as weep holes, fill all vent and drain holes that are exposed in the final condition. Plug with zinc solder and file smooth.
 - 2. Galvanize steel lintels in exterior walls that attach to the structural steel frame unless noted to have other AESS finish.
 - 3. For members that receive field paint, do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

2.05 SOURCE QUALITY CONTROL

- A. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".

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- B. Welded Connections: Visually inspect all shop-welded connections and test complete-joint-penetration welds using the following:
1. Ultrasonic testing performed in accordance with ASTM E164.
 2. Test 10% of CJP welds in Risk Category II structures.
 3. Reductions and increases in the rate of ultrasonic testing shall be in accordance with Paragraphs N5.5e and N5.5f of AISC 360.
 4. Prepare submittal of testing and inspection reports.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Column Baseplates and Beam/Joist Bearing Plates
1. Clean concrete and masonry surfaces to receive base plates or bearing plates.
 2. Use steel shims, leveling nuts, or leveling plates to establish correct bearing elevation.
 3. Snug-tighten anchor rods only after framing area has been positioned and made plumb.
 4. Grout solidly between base plates/bearing plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.
- D. Align and adjust structural steel members to comply with tolerances in AISC 303 prior to permanently connecting to supporting members. Take into account the effect of temperature differences in the structural steel between the time of erection and building completion.
- E. Field weld components indicated on drawings and in compliance with AWS D1.1.
1. Remove paint or galvanizing adjacent to field welds in accordance with AISC 303 and AISC 360.
 2. Remove backing bars and runoff tabs as required for ultrasonic testing of complete-joint-penetration welds.
 3. Weld assemblies in such a manner that maintains mil material tolerances in AISC 303.

- F. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT)"Specification for Structural Joints Using High-Strength Bolts".
 - 1. Ream holes that must be enlarged for bolted connections. Do not enlarge holes by other means.
 - 2. Snug-tighten bolts unless noted otherwise. Tension-control bolts are allowed to be used in all connections if preferred by the erector.
- G. Do not field cut or alter structural members without approval of Architect.

3.03 FIELD QUALITY CONTROL

- A. The Owner's Special Inspector and independent testing agency shall perform field quality control tests and special inspections.
 - 1. Structural steel material verification and inspection of structural steel joints.
 - 2. Weld material verification and inspection of welds.
 - 3. Bolt and connection material verification and inspection of bolted connections.
 - 4. All testing and inspections of Structural Steel Framing and Architecturally Exposed Structural Steel Framing shall be done in conformance with Chapter 17 of the Construction Code and AISC Chapter N.
- B. High-Strength Bolts: The Owner's Special Inspector and independent testing agency shall provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT)"Specification for Structural Joints Using High-Strength Bolts".
- C. Welded Connections: The Owner's Special Inspector and independent testing agency shall visually inspect all field-welded connections and test complete-joint-penetration welds using the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. Test 10% of CJP welds in Risk Category II structures.
 - 3. Reductions and increases in the rate of ultrasonic testing shall be in accordance with Paragraphs N5.5e and N5.5f of AISC 360.

END OF SECTION

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SECTION 05 12 13 - ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.
- B. Section 09 91 13 - Exterior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.
- C. Section 09 91 23 - Interior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.
- D. Section 09 96 00 - High-Performance Coatings: Finish coat requirements and coordination with primer and surface preparation specified in this section.

1.03 DEFINITIONS

- A. Architecturally-Exposed Structural Steel: Structural steel complying with designated AESS category as defined in AISC 303.

1.04 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- B. AISC 360 - Specification for Structural Steel Buildings; 2016.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2019.
- D. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2018.
- F. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2018.
- G. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS); 2022.
- H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

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- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- L. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- M. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.
- N. AISC 325 - Steel Construction Manual.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Schedule and conduct a preinstallation meeting at project site one week prior to start of work of this section; require attendance by all affected installers. Coordinate requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch-up painting, mock-up coordination, Architect's observations, and other requirements for AESS.

1.06 SUBMITTALS

- A. Product data for each type of product specified. Submit paint systems in accordance with Section 09 91 13.
- B. Shop Drawings: Detailing for fabrication of AESS components.
 - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
 - 2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
 - 3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.
 - 4. Indicate orientation of hollow structural section (HSS) seams and mill marks (where applicable).
 - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. Indicate orientation of bolt heads.
 - 6. Indicate which surfaces or edges are exposed and what class of surface preparation is being used.
 - 7. Indicate special tolerances and erection requirements as noted on drawings or defined by the designated AESS category.
 - 8. Indicate vent or drainage holes for HSS members.

- C. AESS 1, AESS 2, AESS 3, and AESS 4 Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS characteristics, including surface preparation, sharp edges ground smooth, continuous weld appearance, weld show through, and fabrication mark removal.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M..
- E. Qualification data for fabricator and erector to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, photographs showing detail of installed AESS, and other information specified.

1.07 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.
 - 1. Failure to clearly indicate revisions with clouds and revision date.
 - 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.08 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.
- C. Submit RFIs only for clarification or interpretation of the Contract Documents. RFIs shall include a list of sheets, plans, sections, details, and specifications in the Contract Documents where the Contractor has already looked for the information being requested.
- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

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1.09 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 12 00, engage a Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.
- B. Erector Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M.
- D. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.
- E. Contractor to engage a quality assurance agency per requirements of AISC 360, Chapter N and AISC 303, Section 10.

1.10 MOCK-UP

- A. Provide mock-ups for AESS 3 and AESS 4 of nature and extent indicated in Contract Documents.
- B. Notify Architect one week in advance of dates and times when mock-ups will be available for review.
- C. Demonstrate applicable AESS characteristics for specified category of AESS on elements and joints in mock-up.
- D. Build mock-ups using member sizes and materials indicated for final work.
- E. Mock-up to demonstrate weld quality, contouring of welds at aligned walls of members, specified surface preparation, and finish coating.
- F. Obtain Architect's written approval of mock-ups before starting fabrication.
- G. Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed work.
- H. Approved mock-ups in an undisturbed condition at Date of Substantial Completion may become part of completed work.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.
- 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. Use special care in handling to prevent twisting or warping of AESS members.

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PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Comply with Section 05 12 00, except as amended in this section for aesthetic purposes.
- B. Comply with AISC 303, Section 10 for specific AESS category designated on drawings.

2.02 FABRICATION

- A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.
- C. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.
- D. Bolted Connections:
 - 1. Make in accordance with Section 05 12 00. Provide bolt type and finish as noted herein.
- E. Welded Connections:
 - 1. Comply with AWS D1.1/D1.1M and Section 05 12 00.
 - 2. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding tolerances of this section.
- F. Surface Preparation:
 - 1. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 - 2. Remove backing and run out tabs.
- G. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
 - 1. AESS 1: Basic elements.
 - 2. AESS 2: Feature elements viewed at a distance greater than 20 feet (feature elements not in close view).
 - 3. AESS 3: Feature elements viewed at a distance less than 20 feet (feature elements in close view).

2.03 PAINT SYSTEM

- A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Sections 09 91 13, 09 91 23, and 09 96 00. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer

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combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.

- B. Primer: As specified in Sections 09 91 13, 09 91 23, and 09 96 00. Primer to comply with all federal standards for VOC, lead and chromate levels.
- C. Finish Coating: Field apply intermediate and top coats per Sections 09 91 13, 09 91 23, and 09 96 00.

2.04 SHOP PRIMING

- A. Surface Preparation:
 - 1. Comply with SSPC-SP 6/NACE No.3.
 - 2. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
 - 3. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
 - 4. Remove weld spatter, slivers and similar surface discontinuities.
 - 5. Ease sharp corners resulting from shearing, flame cutting or grinding.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted with slip-critical connections.
 - 1. Extend priming of members partially embedded in concrete or mortar to a depth of 2 inches.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

2.05 MATERIALS

- A. General: Meet requirements of 05 12 00.
- B. Tension Control, High-Strength Bolts, Nuts, and Washers: Per section 05 12 00, Tension Control Bolts. Provide standard carbon steel finish rounded bolt heads with twist off bolts; ASTM F3125/F3125M.

2.06 SOURCE QUALITY CONTROL

- A. Structural Requirements:
 - 1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 for additional requirements.

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2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- B. AESS 1 and 2 Acceptance: Architect to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.
 - C. AESS 3,4, and C Acceptance: Architect to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Erector to check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

3.02 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by Architect.
- B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AESS through process of erection.

3.03 ERECTION

- A. AESS 1 and 2: Basic elements; feature elements not in close view:
 1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
 2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
 3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
 4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 6. Remove all backing and run out tabs.

7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.
 8. Bolted Connections: Align bolt heads on same side of connection as indicated on approved fabrication or erection documents.
 9. Welded Connections: Comply with AWS D1.1/D1.1M and Section 05 12 00. Appearance and quality of welds to be consistent. Employ methods that will maintain alignment of members without warp exceeding tolerance of this section.
 10. Remove weld spatter exposed to view.
 11. Grind off projections larger than 1/16 inch at field butt and plug welds.
 12. Continuous Welds: Where continuous welding is noted on drawings, provide continuous welds of a uniform size and profile.
 13. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
 14. Splice members only where indicated.
 15. Obtain permission for any torch cutting or field fabrication from Architect. Finish sections thermally cut during erection to a surface appearance consistent with mock-up.
- B. AECS 3: Feature elements in close view:
1. Erect to requirements of AECS 1 and 2 and as follows:
 2. Field Welding: Weld profile, quality, and finish to be consistent with mock-ups approved prior to fabrication.
 3. Provide a continuous appearance to all welded joints including tack welds. Provide joint filler at intermittent welds.

3.04 FIELD QUALITY CONTROL

- A. Structural Requirements: Comply with Section 051200 "Structural Steel Framing".
- B. AECS 1 and 2 Acceptance: Architect to observe AECS in place and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.
- C. AECS 3,4, and C Acceptance: Architect to observe AECS in place and determine acceptability based on qualification data and submittals as well as on approved mock- up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

3.05 CLEANING

- A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AESS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 91 13, 09 91 23, and 09 96 00.

END OF SECTION

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SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Open web steel joists, with bridging, attached seats and anchors.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Placement of anchors and bearing plates for casting into cast-in-place concrete.
- B. Section 042200- Concrete Unit Masonry: Placement of anchors and bearing plates for embedding into masonry.
- C. Section 05 12 00 - Structural Steel Framing: Grouting base plates and bearing plates. Superstructure framing. Field-welded shear connectors.
- D. Section 05 31 00 - Steel Decking:

1.03 REFERENCE STANDARDS

- A. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- B. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2019.
- C. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.
- D. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2018.
- E. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- H. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with Errata (2015).
- I. SJI 100 - Catalog of Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders; 2011.
- J. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; 2008.
- K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- L. SSPC-SP 2 - Hand Tool Cleaning; 2024.

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M. SSPC-SP 3 - Power Tool Cleaning; 2024.

1.04 DEFINITIONS

- A. SJI Specifications: Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders".
- B. Special Joists: Steel joists or joist girders requiring custom design because non-uniform, unequal, net-uplift, or special loading conditions fall outside of the scope of standard joist design load tables in SJI Specifications.

1.05 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and associated product.
- B. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.
- C. Engineering Calculations: For all special design joists and joist girders, provide comprehensive engineering calculations sealed by the responsible professional engineer registered in the state in which the project is located.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M.
- E. Designer's Qualification Statement.
- F. Manufacturer's Qualification Statement.
- G. Fabricator's Qualification Statement.
- H. Erector's Qualification Statement.
- I. Paint Compatibility Certification: From manufacturer's of topcoat applied over shop primer, indicating that shop primer is compatible with the topcoat.
- J. Mill Certificates: For each type of bolt used in shop and field connections.
- K. Certificate of Compliance: At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the Authority Having Jurisdiction stating that the work was performed in accordance with the approved construction documents.

1.06 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.

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1. Failure to clearly indicate revisions with clouds and revision date.
 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.07 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.
- C. Submit RFIs only for clarification or interpretation of the Contract Documents. RFIs shall include a list of sheets, plans, sections, details, and specifications in the Contract Documents where the Contractor has already looked for the information being requested.
- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.08 QUALITY ASSURANCE

- A. Design all special joists and connections not detailed on drawings 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. Perform Work, including that for headers and other supplementary framing, in accordance with SJI 100 Standard Specifications Load Tables and SJI Technical Digest No. 9.
- C. Manufacturer Qualifications: Manufacturer shall be certified by SJI to manufacture joists and joist girders in accordance with SJI standard specifications and load tables.
- D. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products to SJI requirements. This includes protecting joists from corrosion, damage, and deformation during delivery, storage, and handling.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Joists:

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1. Canam Group Inc
2. New Millennium Building Systems
3. Nucor-Vulcraft Group

2.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide joist girders and special joists and connections capable of supporting loads indicated on the drawings.
 1. Use Allowable Stress Design: Loads given on the drawings are service-level loads.
 2. Live Load Deflection Limits:
 - a. K-Series Joists: Vertical Deflection of 1/360 of the span.

2.03 MATERIALS

- A. Open Web Joists: SJI Type K Joists and KCS Joists:
 1. Provide bottom chord extensions as indicated.
 2. Minimum End Bearing on Steel Supports: As shown on the drawings.
 3. Minimum End Bearing on Concrete or Masonry Supports: As shown on drawings.
 4. Finish: Shop primed.
 5. Camber: Camber joists per SJI Specifications unless noted otherwise.
 6. Sloping Seats: Provide for member slopes greater than 1/4" per foot.
 7. Extended Ends: Provide SJI Type R extended ends where indicated on drawings.
- B. Joist Substitutes: Comprised of steel angles or channels manufactured in accordance with SJI Specifications.
- C. Anchor Bolts, Nuts and Washers: ASTM F1554 Grade 36 unless noted otherwise.
- D. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
- E. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FINISH

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer which complies with the performance requirements of SSPC-Paint 15.

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- B. Shop prime joists as specified.
- C. Prepare surfaces to be finished in accordance with SSPC-SP 2.

2.05 STEEL JOIST ACCESSORIES

- A. Bridging: Provide horizontal and diagonal bridging that complies with SJI specifications for associated joists. Provide additional bridging as required for net-uplift on roof joists or non-uniform loading of special design joists. Provide additional erection bridging if required for joist stability.

2.06 SOURCE QUALITY CONTROL

- A. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT)"Specification for Structural Joints Using High-Strength Bolts".
- B. Welded Connections: Visually inspect all shop-welded connections and test all complete-joint-penetration welds using the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify joist support conditions for compliance with construction documents and construction tolerances prior to beginning work. Do not start joist installation until any deficiencies have been corrected.

3.02 ERECTION

- A. Verify all supporting construction is in place and secured prior to erecting joists.
- B. For joists delivered to the site in more than one piece, field-bolt joists on the ground prior to erection.
- C. Erect joists with correct bearing on supports.
- D. Install joist bridging as joist erection progresses. Joist bridging must be installed before any construction loads are applied to the joists.
- E. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
- F. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.
- G. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.
- H. Position and field weld joist chord extensions and wall attachments as detailed.
- I. Install supplementary framing for floor and roof openings.

- J. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- K. Do not field cut or alter structural members without approval of joist manufacturer.
- L. After erection, prime welds, damaged shop primer, damaged galvanizing, and surfaces not shop primed , except surfaces specified not to be primed.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 REPAIRS

- A. Touch-Up Painting: Perform immediately after installation.
 - 1. Clean and prepare field welded areas, rust spots, and abraded surfaces of joists and abutting bearing plates and structural steel.
 - a. SSPC-SP 2 Hand-Tool Cleaning or SSPC-SP 3 Power-Tool Cleaning
 - 2. Use primer compatible with that used in the manufacturing plant.

3.05 FIELD QUALITY CONTROL

- A. The Owner will engage an independent testing agency to perform field quality control tests and inspections of the following:
 - 1. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT)"Specification for Structural Joints Using High-Strength Bolts".
 - 2. Welded Connections: Visually inspect all field-welded connections and test all complete-joint-penetration welds using the following:
 - a. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Correct member size, spacing, orientation, and mark number.
- B. Correct all deficiencies in the Work that inspection reports indicate are not in compliance with the Construction Documents.
- C. Coordinate re-inspection of the work that has been corrected after initial reported deficiencies.

END OF SECTION

SECTION 05 31 00 - STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustical roof deck.
- B. Roof deck.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck and placement of anchors and embed plates into cast-in-place concrete.
- B. Section 042200 - Concrete Unit Masonry: Placement of anchors and embed plates within masonry.
- C. Section 05 12 00 - Structural Steel Framing: Support framing for openings and shear stud connectors.
- D. Section 099113 - Exterior Painting: Repair painting of primed deck and finish painting of deck.
- E. Section 099123 - Interior Painting: Repair painting of primed deck and finish painting of deck.
- F. Section 05 50 00 - Metal Fabrications: Embed plates and angles cast in concrete construction or set in masonry construction.

1.03 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2018).
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2018.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.
- G. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- H. ICC-ES AC70 - Acceptance Criteria for Fasteners Power Driven into Concrete, Steel and Masonry Elements; 2016.
- I. SDI QA/QC - Standard for Quality Control and Quality Assurance for Installation of Steel Deck; 2022.
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

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- K. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- L. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks.

1.04 SUBMITTALS

- A. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- B. Shop Drawings: Indicate deck plan, fastening, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Fabricator's Qualification Statement: Provide documentation showing steel deck fabricator is accredited under IAS AC172.
- D. Test and Evaluation Reports:
 - 1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - a. Power-actuated mechanical fasteners.
 - 2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.
- E. Qualification Statements and Welding Certificates: For deck welding personnel.

1.05 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.
 - 1. Failure to clearly indicate revisions with clouds and revision date.
 - 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.06 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.
- C. Submit RFIs only for clarification or interpretation of the Contract Documents. RFIs shall include a list of sheets, plans, sections, details, and specifications in the Contract Documents where the Contractor has already looked for the information being requested.
- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel deck fabricator that is a member of the Steel Deck Institute (SDI).
- B. FM Approvals' RoofNav Listing: Provide steel roof deck evaluated by FM Approvals and listed in its "RoofNav" for Class 1 fire rating and Class 1-90 windstorm rating. Identify materials with FM Approvals Certification markings.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage and handling.
- B. Protect with a waterproof covering and ventilate to avoid condensation.
- C. Store products in accordance with SDI MOC3. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.02 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade Grade 50/340, Class 1, 2, or 4, with G60/Z180 galvanized coating.
 - 2. Primer: Shop coat of manufacturer's standard primer paint over bottom of galvanized deck at areas where deck is to receive field paint.

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3. Structural Properties:
 - a. Span Design: Triple-span or more.
4. Nominal Height: As indicated.
5. Profile: Fluted.
6. Side Joints: Lapped, mechanically fastened.
7. End Joints: Lapped, mechanically fastened at 1 1/2" deck. Butted, mechanically fastened at 3 1/2" dovetail deck.

2.03 ACCESSORY MATERIALS

- A. Welding Materials: AWS D1.1/D1.1M.
- B. Fasteners: Galvanized hardened steel, self tapping.
- C. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.
- D. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 20 gauge, 0.0359 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Pour Stops and Girder Fillers: Steel sheet of same material and finish as deck with thickness and profile recommended by SDI standards for overhang distance and slab depth.
- C. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet of same material, finish, and thickness as deck unless noted otherwise.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions of supporting framing prior to beginning work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

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- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate bundles of deck in such a manner as to avoid overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting framing before installing permanent fasteners. Do not stretch or contract interlocking side-laps.
- E. Place deck panels flat and square to fasten to supporting frame without warp or deflection.
- F. Fit deck panels neatly around openings by cutting and using appropriate deck accessories.
- G. On concrete and masonry surfaces provide minimum 4 inch bearing.
- H. On steel supports provide minimum 1-1/2 inch bearing.
- I. Fasten deck to steel support members at ends and intermediate supports as indicated.
- J. At mechanically fastened male/female side laps fasten at spacing indicated.
- K. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- L. At welded male/female side laps weld at spacing indicated.
- M. Weld deck in accordance with AWS D1.3/D1.3M.
- N. End Joints: Butted for dovetail deck. Lapped 2" for all other deck types.
- O. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings in order to close openings, reinforce deck, provide deck continuity, and support other work.
- P. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.

3.03 REPAIR

- A. Galvanizing Repairs: Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up galvanizing repair paint.
- B. Painting Repairs:
 - 1. Prepare rust spots, welds, and abraded areas on bottom surface of prime-painted deck using wire brush immediately after deck installation.
 - 2. Repair prepared areas of bottom of deck using the same primer and color as applied in the shop.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:

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1. Special Inspections and qualifications of welding Special Inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
 - a. Field welds and mechanical fastening of deck are subject to inspection.
 2. Steel decking will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Load-bearing wall framing.
- B. Exterior non-load-bearing wall framing.
- C. interior non-load bearing wall framing exceeding height limitations of standard non-structural cold-formed framing.
- D. Exterior wall sheathing.
- E. Formed steel joist and purlin framing and bridging.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Cold-formed steel nonstructural framing.
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum-based sheathing.
- C. Section 09 22 16 - Non-Structural Metal Framing.

1.03 DEFINITIONS

- A. General: See AISI S240 for definitions of terms used in this section.
- B. Connection: A combination of structural elements and joints used to transmit forces between two or more members.
- C. Connector: A device used to transmit forces between cold-formed steel structural members or between a cold-formed steel structural member and another structural element.

1.04 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2018).
- B. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data; 2017.
- C. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- 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 A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

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- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- H. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.
- I. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- L. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.
- M. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.
- B. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section; require attendance by affected installers.

1.06 SUBMITTALS

- A. Product Data: Provide data on cold-formed steel structural members; include material descriptions and base steel thickness.
- B. Product Data: Provide manufacturer's data on factory-made connectors and mechanical fasteners, showing compliance with requirements.
- C. 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 other framing connections.
- D. Design Data:
 - 1. Shop drawings signed and sealed by a professional structural engineer.
 - 2. Design calculations sufficient to demonstrate compliance with design criteria; signed and sealed by a professional structural engineer.
 - 3. Details and calculations for factory-made connectors, signed and sealed by a professional structural engineer.

- E. Evaluation Service Reports: Provide reports indicating compliance with specified requirements for cold-formed steel structural members, connectors, mechanical fasteners, and hold-downs.
- F. Inspection Reports: Provide material verification Inspection Reports in accordance with requirements of AISI S240.
- G. Inspection Reports: Provide Inspection Reports for welding, mechanical fastening, and cold-formed steel light-frame construction in accordance with requirements of AISI S240.
- H. Manufacturer's Installation Instructions: Provide installation instructions for connectors.
- I. Installation Drawings: Indicate dimensioned locations of cold-formed steel structural framing.
 - 1. Include materials.
- J. Designer's Qualification Statement.
- K. Manufacturer's Qualification statement.
- L. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M.
- M. SSMA Manufacturer Qualification: Submit documentation of manufacturer association membership.

1.07 SUBMITTAL PROCEDURES

- A. Submit shop drawings and product data in complete packages so that all parts of a given component or area may be reviewed together.
- B. Indicate the applicable Contract Drawings and Specification Sections used to develop the submittal.
- C. All modifications or revisions to submittals must be clearly clouded with a revision number and date indicated. Clouding of entire sheets, plans, sections, or details is not acceptable unless the sheet, plan, section, or detail is completely new to the revised submittal. The following may be considered cause for rejection of the submittal without review by the Engineer of Record.
 - 1. Failure to clearly indicate revisions with clouds and revision date.
 - 2. Submittal contains revisions or modifications to a previously reviewed submittal that were not requested by the Engineer of Record.
- D. Resubmittals: Make corrections and completely address all previous comments prior to resubmitting shop drawings and product data. The Engineer of Record will only review those sheets, plans, sections, and details that have been clouded and tagged with a revision triangle.

1.08 REQUESTS FOR INFORMATION (RFI) PROCEDURES

- A. RFIs shall be submitted by the Contractor. RFIs submitted by any other entity will not be reviewed.
- B. Limit RFIs to one main subject. RFIs including more than one main subject will be returned with a request to break them up into multiple RFIs.

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- C. Submit RFIs only for clarification or interpretation of the Contract Documents. RFIs shall include a list of sheets, plans, sections, details, and specifications in the Contract Documents where the Contractor has already looked for the information being requested.
- D. RFIs requesting a substitution will be rejected. Any substitution requests shall follow Substitution Procedures indicated in Division 01 Specifications.
- E. RFIs submitted for correction of field work shall include the Contractor's proposed solution. Provide an engineered solution from the Contractor's engineer in applicable situations.

1.09 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a professional structural engineer experienced in designing this work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Connectors:
 - 1. ClarkDietrich
 - 2. MarinoWARE
 - 3. Simpson Strong-Tie
 - 4. The Steel Network
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI S240.
- B. Regulatory Requirements: Comply with applicable building code criteria for loads, including seismic loads.
- C. Design Criteria: As indicated on the drawings.
 - 1. Live load deflection meeting the following, unless otherwise indicated:

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- a. Floors: Maximum vertical deflection under live load of 1/480 of span.
 - b. Roofs: Maximum vertical deflection under live load of 1/360 of span.
 - c. Exterior Walls (Typical): Maximum horizontal deflection under wind load of 1/360 of span.
 - d. Exterior Walls with Brick or Stucco Finish: Maximum horizontal deflection under wind load of 1/600 of span.
 - e. Design non-axial loadbearing framing to accommodate not less than 3/4 in vertical deflection.
2. 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.
 3. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
 1. Structural Grade: ST33H for 33 and 43 mil members, ST50H for 54 mil and thicker members.
 2. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
- B. Recycled Content: Provide steel with at least 30 percent post-consumer recycled content.

2.04 STRUCTURAL FRAMING COMPONENTS

- A. Wall Studs and Track Sections: AISI S240; c-shaped studs and u-shaped track sections in stud-matching nominal width and compatible height.
 1. Structural Grade: As required to meet design criteria.
 2. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
 3. Thickness and Depth: Depth as indicated on the drawings; thickness and structural grade as required to meet design criteria.
- B. Joists: AISI S240; manufactured, engineered open-web steel joists.
 1. Structural Grade: As required to meet design criteria.
 2. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
 3. Thickness and Depth: Depth as indicated on drawings; thickness and structural grade as required to meet specified design criteria.

2.05 CONNECTIONS

- A. Performance Requirements: Provide connections in compliance with requirements of AISI S240.
- B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
 - 1. Structural Grade: As required to meet design criteria.
 - 2. Corrosion Protection Coating Designation: CP 90 in accordance with AISI S240.
- C. Structural Performance: Maintain load and movement capacity required by applicable building code and specified design criteria.
- D. 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.
 - 1. 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 3/4 inch.
 - 2. 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 3/4 inch.
 - 3. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 10 feet.
 - 4. Provide top track with long leg track and head of wall movement connectors; minimum track length of 10 feet.
- E. Fixed Connections: Provide non-movement devices for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
- F. Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connectors where indicated on the drawings.

2.06 MISCELLANEOUS CONNECTIONS

- 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 and AWS D1.3/D1.3M.

2.07 SHEATHING

- A. Glass-mat-faced gypsum board; ASTM C1177/C1177M, square long edges, 5/8 inch thick.

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2.08 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Plates, Gussets, Clips: Formed Sheet Steel, thickness determined for conditions encountered; finish to match framing components.
- C. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 PREPARATION

- A. Structural Wall Foundations: For gaps between wall bottom track and top of foundation 1/4 inch or greater, level substrate with loadbearing shims or grout between track and foundation.

3.03 INSTALLATION - GENERAL

- A. Install structural members and connections in compliance with ASTM C1007.

3.04 INSTALLATION OF STUDS

- A. Install wall studs plumb and level.
- B. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- C. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.
- D. Install load-bearing studs; brace, and reinforce to develop full strength and achieve design requirements.
- E. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- F. Install intermediate studs above and below openings to align with wall stud spacing.
- G. Provide deflection allowance in stud track, directly below horizontal building framing at non-loadbearing framing.
- H. Attach cross studs to studs for attachment of fixtures anchored to walls.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged corrosion-protected surfaces zinc-rich paint in compliance with ASTM A780/A780M.

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3.05 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Place joists at 16 inches on center maximum; not more than 2 inches from abutting walls, and connect joists to supports using fastener method.
- D. Set floor and ceiling joists parallel and level, with lateral bracing and bridging.
- E. Locate joist end bearing directly over load-bearing studs or provide load distribution on top of stud track.
- F. Provide web stiffeners at reaction points.
- G. Touch-up field welds and damaged galvanized surfaces with primer.

3.06 INSTALLATION OF WALL SHEATHING

- A. Install wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.

3.07 FIELD QUALITY CONTROL

- A. Provide material verification inspections in accordance with requirements of AISI S240.
- B. Owner will employ Special Inspector and independent testing agency for inspections of welding, mechanical fastening, and cold-formed steel light-frame construction in accordance with requirements of AISI S240.
 - 1. Size, flange width, steel grade, steel thickness, and spacing of members.
 - 2. Field and shop connections of cold-formed steel members to each other.
 - 3. Field and shop connections of cold-formed steel members to other structure.

3.08 TOLERANCES

- A. Studs - Vertical Alignment (Plumbness): 1/960 of span or 1/8 inch in 10 ft, in accordance with ASTM C1007.
- B. Studs - Maximum Variation from True Position: 1/8 inch in accordance with ASTM C1007.
- C. Stud Spacing: 1/8 inch from the designated spacing, provided that the cumulative error does not exceed the requirements of the finishing materials in accordance with ASTM C1007.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items.
- B. Downspout boots.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2016).
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- G. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- I. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- J. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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.

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- 3) Member sizes and gauges.
- 4) Details of connections.
- 5) Support reactions.
- 6) Bracing requirements.
- C. Designer's Qualification Statement.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Design _____ 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. 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. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

2.03 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 continuous welds.
- 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.

2.04 FABRICATED ITEMS

- A. Bumper Posts and Guard Rails: As detailed; prime paint finish.
- B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- C. Joist Hangers: Strap anchors, fabricated with sheet steel, 18 gauge, 0.0478 inch minimum base metal thickness; galvanized finish.
- D. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.
- E. Lintels: As detailed; prime paint finish.
- F. Sill Angles for Tempered Glass Railing Assemblies: ASTM A36/A36M steel angles with anchoring devices and sizes as indicated in shop drawings for railing assembly, drilled and tapped for fastener types, sizes, and spacing indicated, prime paint finish.
- G. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish.
- H. Recessed Mat Frames : As detailed; steel, galvanized finish.
- I. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.
- J. Toilet Partition Suspension Members: Steel channel sections; prime paint finish.
- K. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

2.05 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. Configuration: Angular.
 - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 - 3. Color: To be selected by Architect from manufacturer's standard range.
 - 4. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.

2.06 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for _____ finish.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

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- 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.

2.07 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. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

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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 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preservative treated wood materials.
- B. Communications and electrical room mounting boards.
- C. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- B. AWWA U1 - Use Category System: User Specification for Treated Wood; 2018.
- C. PS 1 - Structural Plywood; 2009.
- D. PS 20 - American Softwood Lumber Standard; 2020.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. 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.
 - 2. 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.

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2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWP A 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 AWP A standards.
- B. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.

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- 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.

3.02 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.

3.03 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.

3.04 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
 - 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.

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- 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

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SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Hardware.
- C. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

- A. AWI (QCP) - Quality Certification Program; Current Edition.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 3. Include key plan showing the location of all casework in the project.
 - 4. Indicate drawer and cabinet construction including component thicknesses.
 - 5. Detail edge banding.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual sample items of proposed pulls, hinges, locksets, and shelf rests, drawer slides and grommets, demonstrating hardware design, quality, and finish.

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1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 3. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.

1.07 MOCK-UP

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.09 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
 - 3. Finish - Semi-Exposed Surfaces: Decorative laminate unless noted otherwise.

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4. Finish - Concealed Surfaces: Manufacturer's option.
5. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
6. Casework Construction Type: Type A - Frameless.
7. Interface Style for Cabinet and Door: Style 1 - Overlay; .
8. Adjustable Shelf Loading: 50 lbs. per sq. ft.; typical. 100 lbs. per sq. ft. at file and printer drawers or unless noted otherwise.
 - a. Deflection: L/144.
9. Cabinet Style: Flush overlay.
10. Cabinet Doors and Drawer Fronts: Flush style.
11. Drawer Side Construction: Multiple-dovetailed.
12. Drawer Construction Technique: Per quality standard.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LAMINATE MATERIALS

- A. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as indicated.
 1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, color as selected, finish as indicated.
 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, color as selected, finish as indicated.

2.04 COUNTERTOPS

- A. Countertops are specified in Section 12 36 00.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Glass: Fully tempered safety glass: Complies with 16 CFR 1201 for hazardous locations.
- C. Fasteners: Size and type to suit application.

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- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard plastic or rubber grommets for cut-outs, in color to match adjacent surface.
- G. Base at toe-kick: Provide plastic laminated toe-kick unless indicated otherwise on the drawings.

2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.
 - 1. BHMA A156.9, Hafele #282.11.710
- C. Wall Mounted Adjustable Shelf Supports: Standard, heavy-duty back-mounted adjustable standards and brackets.
 - 1. Shelf Fasteners: Product: [154 ANO] manufactured by [Knappe & Vogt] or equal.
- D. Fixed Americans with Disabilities Act (ADA)-Compliant Vanity and Countertop Brackets:
 - 1. Products: As scheduled on the drawings.
- E. Countertop Supports:
 - 1. Manufacturers: As scheduled on the drawings.
- F. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers; unless scheduled on the drawings.
- G. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
- H. Drawer Slides:
 - 1. Type: Full extension with overtravel.
 - 2. Static Load Capacity: Extra Heavy Duty grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed and smooth, soft close function type.
- I. Hinges: European style concealed self-closing type, slow, soft closing, steel with satin finish.

- J. Soft Close Adapter: Concealed, frame-mounted, screw-adjustable damper; steel with polished finish.
- K. Sliding Door Track Assemblies: Upper and lower track of satin anodized aluminum, with matching shoe equipped with nylon rollers.
- L. Coat Hooks: As scheduled on the drawings.
- M. Closet Rods: As scheduled on the drawings.

2.07 SHOP TREATMENT OF WOOD MATERIALS

- A. Provide UL (DIR) listed and approved identification on fire retardant treated material.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: 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.
 - 1. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Install work in accordance with AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.

- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- H. Caulk perimeter.
- I. Fasten wall cabinets at top and bottom.
- J. Locate grommets where directed by the Owner.

3.03 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 14 00 - FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cold-applied rubberized asphalt waterproofing.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Masonry joints prepared to receive flashings.
- B. Section 07 21 00 - Thermal Insulation: Insulation used for protective cover.

1.03 REFERENCE STANDARDS

- A. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.
- B. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.

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. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Construct mock-up consisting of 100 sq ft of horizontal and vertical fluid-applied waterproofing; to represent finished work including internal and external corners, drainage panel, base flashings, control joints, expansion joints, counterflashings, protective cover, and ____.
- C. Locate where directed.
- D. Mock-up may remain as part of work.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Single Component Cold-Applied Rubberized Asphalt emulsion waterproofing/dampproofing:
 - 1. Basis of Design: Henry HE787 Elastomulsion Waterproofing.

2.02 FLUID-APPLIED WATERPROOFING APPLICATIONS

- A. Single Component Cold-Applied Rubberized Asphalt Emulsion Waterproofing/Dampproofing:
 - 1. Location: CMU & concete foundation walls.
 - 2. Cover with protection board.

2.03 FLUID-APPLIED WATERPROOFING MATERIALS

- A. Single Component Cold-Applied Rubberized Asphalt Waterproofing/Dampproofing: Rubberized asphaltic compound, suitable for installation on concrete and concrete masonry.
 - 1. Cured Thickness: 60 mil, 0.060 inch, minimum.
 - 2. Water Vapor Permeance: 0.05, maximum, when tested in accordance with ASTM E96/E96M.

2.04 ACCESSORIES

- A. Protection Board: Rigid insulation; see Section 07 21 00.

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 detrimental to adhesion or application of waterproofing system.
- C. Verify that items penetrating surfaces to receive waterproofing are securely installed.
- D. Do not proceed with this work until unsatisfactory conditions have been corrected.

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3.02 PREPARATION

- A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.
- B. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.
- C. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.

3.03 INSTALLATION

- A. Install waterproofing to specified minimum thickness in accordance with manufacturers instructions and NRCA (WM) applicable requirements.
- B. Seal membrane and flashings to adjoining surfaces.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

- A. Place protection board directly against drainage panel; butt joints, and scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, over roof deck, and exterior wall behind wall finish.
- B. Mineral fiber blanket insulation in exterior wall and ceiling construction.
- C. Mineral fiber blanket insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- D. Mineral fiber board insulation to infill fluted roof deck at building envelope transitions

1.02 RELATED REQUIREMENTS

- A. Section 07 26 00 - Vapor Retarders: Separate vapor retarder materials.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

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PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation Inside Masonry Cavity Walls: Polyisocyanurate board
- D. Insulation Over Metal Stud Framed Walls, Continuous (CI): Polyisocyanurate board.
- E. Insulation in Metal Framed Walls: Mineral Fiber blanket insulation with no vapor retarder.
- F. Insulation to infill fluted roof deck voids: Mineral fiber board insulation

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
 - 5. Board Size: 48 inch by 96 inch.
 - 6. Board Thickness: 2 inch.
 - 7. Board Edges: Shiplap, at long edges.
- B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
 - 1. Basis of Design: Hunter XCI CG
 - 2. Classifications:
 - a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
 - 1) Class 2 - Faced with coated glass fiber mat facers on both major surfaces of core foam.
 - 2) Compressive Strength: Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.
 - 3) Thermal Resistance, R-value: At 2.5 inch thick; R-15, minimum, at 75 degrees F.
 - 3. Board Size: 48 inch by 96 inch.

4. Board Thickness: 2.5 inch.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 3. Thickness: Match Stud Depth

2.04 ACCESSORIES

- A. Rigid Insulation adhesive: See Section 07 27 26.
- B. Rainscreen attachment system (CI System): See Section 07 48 00

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.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Adhere a 6 inches wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
 1. Tape seal joints.
 2. Extend sheet full height of joint.
- B. Apply adhesive to back of boards:
 1. Three continuous beads per board length.
 2. Full bed 1/8 inch thick.
- C. Install boards horizontally on foundation perimeter.
 1. Place boards to maximize adhesive contact.
 2. Install in running bond pattern.
 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- D. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

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- F. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.

3.03 BOARD INSTALLATION AT CAVITY WALLS (CONTINUOUS INSULATION)

- A. Secure impane fasteners to substrate at following frequency:
 - 1. Six (6) per insulation board.
- B. Install boards to fit snugly between wall ties and z-furring.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION USING COMPOSITE FRAMING SUPPORT (CFS) SYSTEM

- A. Install CFS system in accordance with manufacturer's installation instructions.
- B. Install CFS system in compliance with system orientation, sizes, and locations as indicated on drawings.
- C. Install CFS system to fill-in exterior wall spaces without gaps or voids, and do not compress insulation boards.
- D. Trim insulation neatly to fit spaces, and insulate miscellaneous gaps and voids with approved expandable foam sealant.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.07 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

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SECTION 07 27 26 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01-General Requirements shall be read in conjunction with and govern this section.
- B. The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the Subcontractor the extent of their Work.

SUMMARY

- A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings Architectural Division as specified herein including, but not limited to, the following:
 - 1. Adhesives/Primers
 - 2. Fluid Applied, Vapor Permeable Air & Water Barrier Membrane
 - 3. Transition Membranes
 - 4. Sealant
 - 5. Thru-wall flashing
 - 6. Insulation Adhesive

RELATED REQUIREMENTS

- A. DIVISION 04 – Masonry Section 04 20 00 – Unit Masonry
- B. DIVISION 06 – Wood, Plastics, and Composites Section 06 16 00 Sheathing
- C. DIVISION 07 – Thermal and Moisture Protection Section 07 21 00 - Thermal Insulation
- D. DIVISION 07 - Roofing & Siding Panels Section 07 46 46 - Fiber Cement Siding
- E. DIVISION 07 – Thermal and Moisture Protection Section 07 62 00 - Sheet Metal Flashing and Trim
- F. DIVISION 07 – Thermal and Moisture Protection Section 07 92 00 - Joint Sealants
- G. DIVISION 08 –Openings Section 08 40 00 - Entrances, Storefronts, and Curtain Walls

ALTERNATES

- A. Submit requests for alternates in accordance with Section 01 60 00.
- B. Alternate submission format to include:

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1. Evidence that alternate materials meet or exceed performance characteristics of product requirements and documentation from an approved independent testing laboratory certifying that the performance of the system including auxiliary components exceed the requirements of the local building code.
 2. References clearly indicating that the Air Barrier Manufacturer has successfully completed projects of similar scope and nature on an annual basis for a minimum of ten (10) years.
 3. Air Barrier Manufacturer's guide specification.
 4. Air Barrier Manufacturer's complete set of technical data sheets for assembly.
 5. Air Barrier Manufacturer's complete set of details for assembly.
 6. Product certification that the assembly components are supplied and warranted by single source Air Barrier Manufacturer.
 7. LEED HPD declaration
 8. Air Barrier Manufacturer statement that anticipated wall assembly passes NFPA 285.
 9. Sample warranty as specified.
- C. Submit requests for alternates to this specification a minimum of ten (10) working days prior to bid date. Include a list of twenty-five (25) projects executed over the past five (5) years.
- D. Acceptable alternates will be confirmed by addendum. Substitute materials not approved in writing prior to tender closing shall not be permitted for use on this project.

REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
1. AMMA 2400-02, Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction
- B. American Society for Testing and Materials (ASTM):
1. ASTM D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension
 2. ASTM D471, Standard Test Method for Rubber Property - Effect of Liquids
 3. ASTM D1970, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 4. ASTM D2243, Standard Test Method for Freeze-Thaw Resistance of Water-Borne Coatings
 5. ASTM D5590, Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay

6. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 7. ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials
 8. ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 9. ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 10. ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 11. ASTM E1354, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
 12. ASTM E1677, Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
 13. ASTM E2112, Standard Practice for Installation of Exterior Windows, Doors and Skylights
 14. ASTM E2178, Standard Test Method for Air Permeance of Building Materials
 15. ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- C. National Fire and Protection Agency (NFPA):
1. NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Coordinate the Work of this Section with the installation of exterior substrate. Sequence Work so that installation of fluid-applied air barrier coincides with installation of substrate preparation without causing delay to the Work.
- B. Pre-installation meetings:
1. When required, and with prior notice, an Air Barrier Manufacturer representative will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the assembly.

SUBMITTALS

- A. Provide the following requested information in accordance with Section [project specific] Submittal Procedures.
- B. Action Submittals:

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1. Product Data:
 - a. Air Barrier Manufacturer's guide specification.
 - b. Air Barrier Manufacturer's complete set of technical data sheets for assembly.
 - c. Air Barrier Manufacturer's complete set of standard detail drawings.
2. Certificates:
 - a. Product certification that the assembly components are supplied and warranted by single source Air Barrier Manufacturer.
 - b. Statement that installing contractor is authorized by Air Barrier Manufacturer to complete Work as specified.
3. Tests and Evaluation Reports:
 - a. NFPA 285 wall assembly compliance:
 - 1) Air Barrier Manufacturer statement that anticipated wall assembly passes NFPA 285.
4. Warranty:
 - a. Sample warranty as specified.

QUALITY ASSURANCE

- A. Single Source Responsibility:
 1. Obtain fluid-applied membrane air barrier, transition membranes, air barrier sealants, primers, mastics, and adhesives from a single Air Barrier Manufacturer regularly engaged in the manufacturing and supply of the specified products.
 2. Contactor to verify product compliance with federal, state, and local regulations controlling use of Volatile Organic Compounds (VOC).
- B. Manufacturer Qualifications:
 1. Air Barrier Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
 - a. Air Barrier Manufacturer must not issue warranties for terms longer than they have been manufacturing and supplying specified products for similar scope of Work.
- C. Installer Qualifications:
 1. Perform Work in accordance with Air Barrier Manufacturer published literature and as specified in this section.
 2. Maintain one (1) copy of Air Barrier Manufacturer's instructions on site.

3. At all times during the execution of the Work allow access to site by the Air Barrier Manufacturer representative.
4. If meeting with Air Barrier Manufacturer during project construction, contact Air Barrier Manufacturer a minimum of two weeks prior to schedule meeting.

MOCK-UPS

- A. Mock-ups:
 1. Where directed by architect construct mock-ups to verify selections made under submittals.

DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
 1. Materials shall be delivered to the jobsite in undamaged and clearly marked containers indicating the name of the Air Barrier Manufacturer and product.
- B. Storage of Materials:
 1. Store materials as recommended by Air Barrier Manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including but not limited to MSDS sheets, Product Data sheets, product labels, and specific instructions for personal protection.
 2. Keep solvents away from open flame or excessive heat.
 3. Products should be stored in closed containers.
 4. Store rolled materials on end in original packaging.
 5. Protect rolls from direct sunlight until ready for use.
 6. Refer to Air Barrier Manufacturer published literature.
- C. Handling:
 1. Refer to Air Barrier Manufacturer published literature.

SITE CONDITIONS

- A. Environmental Requirements:
 1. No Work shall be performed during rain or inclement weather.
 2. No Work shall be performed on frost or wet covered surfaces.
- B. Protection:
 1. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

- C. Ensure all preparation Work is completed prior to installing fluid-applied membrane air barrier.

WARRANTY

- A. Manufacturer Material Warranty:
 - 1. Provide Air Barrier Manufacturer's standard material warranty.

PART 2 PRODUCTS

13.01 MATERIALS MANUFACTURER

- A. Components and auxiliary materials must be obtained as a single-source from the assembly Air Barrier Manufacturer to ensure total system compatibility and integrity.
- B. Basis of Design:
 - 1. Henry Company
 - a. 999 N. Sepulveda Blvd. Suite 800
 - b. El Segundo, CA 90245
 - c. (800) 486-1278
 - d. www.Henry.com

MATERIALS

- A. Primary Fluid-Applied Membrane Air Barrier (Basis of Design):
 - 1. One-component, water-based, elastomeric emulsion membrane, designed to provide a vapor permeable air and water barrier when applied above-grade wall assemblies, having the following properties:
 - a. Basis of Design Product: Henry Air-Bloc 17MR
 - b. Color: Graphite
 - c. Solids Content:
 - 1) By Weight: 63%
 - 2) By Volume: 53%
 - d. Service Temperature:
 - 1) Low Temperature: -40 degrees F (-40 degrees C)
 - 2) High Temperature: +180 degrees F (+80 degrees C)
 - e. Application Temperature:
 - 1) Low Temperature: +20 degrees F (-6 degrees C)

- 2) High Temperature: +122 degrees F (+50 degrees C)
 - f. Tensile Strength (ASTM D412): 104 psi (717 kPa)
 - g. Elongation (ASTM D412): 420%
 - h. Low Temperature Flexibility @ -22 degrees F (-30 degrees C) (ASTM D1970): Pass
 - i. Freeze-Thaw Resistance (ASTM D2243): Pass; 10 cycles
 - j. Nail Sealability (ASTM D1970): Pass
 - k. VOC Content: 100 grams/liter max.
 - l. Water Absorption (ASTM D471, modified): 5.6%
 - m. Water Vapor Permeance (ASTM E96 B) @ 40 mils nominal dry film: 14 perms
 - n. Air Permeability:
 - 1) Assembly Air Leakage (ASTM E2357): Pass
 - 2) Building Material (ASTM E2178): 0.0001 cfm/ft2 (0.0005 L/s.m2)
 - o. Chemical Resistance: Resists salt solutions, mild acids and alkalis. Non-resistant to oils, grease or solvents
 - p. Fire Testing (NFPA 285): Complies in various assemblies
 - q. Flame Spread/Smoke Development (ASTM E84): 10/15
 - r. Resistance to Mold, Mildew, and Fungal Growth (ASTM D5590): No growth
- B. Primary Fluid-Applied Waterproofing:
- 1. Single component, cold-applied, rubberized asphalt emulsion which cures to provide a heavy duty seamless, rubber-like membrane having the following properties
 - a. Basis of Design Product: Henry 787
 - b. Color: Black
 - c. Solids Content:
 - 1) By Weight: >70%
 - 2) By Volume: 70%
 - d. Peel Strength (ASTM D 1876): 17.6 lbs/in
 - e. Water Vapor Permeance (ASTM E 96): 0.05
 - f. Elongation Initial (ASTM D 412): 1250%
 - g. Flash Point: >212 deg F

C. Auxiliary Materials

1. Transition Membranes:

a. Liquid applied flashings:

- 1) Moisture-curing one component elastomeric liquid applied flashing membrane using a highly advanced STPe (Silyl-Terminated Polyether) polymer, having the following properties:
 - (a) Basis of Design Product: Henry Air-Bloc LF
 - (b) Color: Blue
 - (c) Air Leakage (ASTM E2178): <0.004 L/s/m² @ 75Pa
 - (d) Water Vapor Permeance (ASTM E96, Method B): 21.8 perms @25 mils
 - (e) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
 - (f) Water Resistance (AC212/ASTM D2247): Pass
 - (g) Nail Sealability (AMMA 711): Pass
 - (h) Surface Burning Characteristics (ASTM E84):
 - (1) Class A
 - (2) Flame Spread/Smoke Development (ASTM E84): 20/5
 - (i) Tensile Strength (ASTM D412): 132 psi
 - (j) Elongation (ASTM D412): 264%

b. Self-Adhering flashings:

- 1) Non-vapor permeable, self-adhered water resistive air and vapor barrier membrane consisting of an SBS rubberized asphalt compound, which is integrally laminated to a blue engineered thermoplastic film, having the following properties:
 - (a) Basis of Design Product: Henry Blueskin SA
 - (b) Color: Blue
 - (c) Water Vapor Permeance (ASTM E96, Method A): .86 perms
 - (d) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
 - (e) Air Leakage (ASTM E2178): <0.0005 L/s/m² @ 75Pa
 - (f) Water Tightness (CAN/CGSB-37.58-M86): Pass.
 - (g) Nail Sealability (ASTM D1970): Pass.

(h) Tensile Strength:

(1) Membrane (ASTM D412-modified): 500 psi minimum

(2) Film (ASTM D828): 5000 psi minimum

(i) Elongation (ASTM D412-modified): 200% minimum

2. Sheathing Joint Membranes:

a. Vapor permeable, self-adhered water resistive air barrier membrane consisting of an engineered film and patented, permeable adhesive technology with split-back poly-release film, having the following properties:

1) Basis of Design Product: Henry Blueskin VP160

2) Color: Blue

3) Air Leakage (ASTM E2178): <0.02 L/s/m² @ 75Pa

4) Water Vapor Permeance (ASTM E96, Method A): 29 perms

5) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass

6) Resistance to Water Penetration (ICC-ES AC 38): Pass.

7) Nail Sealability (ASTM D1970): Pass

8) Surface Burning Characteristics (ASTM E84):

(a) Class A

(b) Flame Spread/Smoke Development (ASTM E84): 0/105

9) Tensile Strength (ASTM D828): 182N MD/129N CD

10) Cycling and Elongation (ICC-ES AC48): Pass

b. Contact Air Barrier Manufacturer for a complete list of authorized transition membranes.

3. Adhesives and Primers:

a. Spray adhesive, and having the following properties:

1) Basis of Design Product: Blueskin Spray Prep

2) Color: Clear amber

3) Solids Content (By Weight): 35%

4) Aerosol

b. Synthetic rubber based adhesive type, quick setting, having the following properties:

- 1) Basis of Design Product: Blueskin Adhesive
- 2) Color: Blue.
- 3) Solids Content (By Weight): 35%.
- 4) Solvent based: Maximum VOC: 450 g/L
- c. Polymer emulsion based adhesive type, quick setting, low VOC content, having the following properties:
 - 1) Basis of Design Product: Blueskin LVC Adhesive
 - 2) Color: Blue.
 - 3) Solids Content (By Weight): 40%.
 - 4) Solvent based: 240 g/L.
- d. Polymer emulsion based primer for self-adhered membranes, and having the following properties:
 - 1) Basis of Design Product: Aquatac Primer
 - 2) Color: Aqua.
 - 3) Solids Content (By Weight): 58%.
 - 4) Water based: Maximum VOC: 50 g/l
4. Sealants:
 - a. Building Envelope Sealant:
 - 1) Moisture cure, medium modulus polymer modified sealing compound, having the following properties:
 - (a) Basis of Design Product: HE925 BES Sealant
 - (b) Complies with Fed. Spec. TT-S-00230C, Type II, Class A.
 - (c) Complies with ASTM C920, Type S, Grade NS, Class 35.
 - (d) Elongation: 450 – 550%.
 - (e) Remains flexible with aging.
 - b. Sheathing Joint Sealants:
 - 1) As recommended by Air Barrier Manufacturer
 - c. Contact Air Barrier Manufacturer for a complete list of authorized sealants.
5. Self-Adhesive Thru-Wall Flashing Membrane:

- a. Non-vapor permeable, self-adhered water resistive air and vapor barrier membrane consisting of an SBS rubberized asphalt compound, which is integrally laminated to a blue engineered thermoplastic film, having the following properties:
 - 1) Basis of Design Product: Blueskin TWF
 - 2) Color: Yellow
 - 3) High Temperature Stability - Flow Resistance (ASTM D5147): Pass
 - 4) Air leakage (ASTM E283): 0.005 L/s.m² @ 75 Pa
 - 5) Water vapor permeance (ASTM E96, Method B): 0.03 perms
 - 6) Low temperature flexibility (CGSB 37-GP-56M): Pass

D. Insulation Adhesive: (optional)

1. Synthetic rubber base compound having the following characteristics:
 - a. Basis of Design Product: Air-Bloc 21
 - b. Color: Cream.
 - c. Compatible with air barrier membrane, substrate and insulation materials.
 - d. Long term flexibility (CGSB 71-GP-24M): Pass.
 - e. Chemical resistance: Alkalis, mild acid and salt solutions.

PART 3 EXECUTION

15.01 EXAMINATION

A. Substrate Conditions:

1. Verify substrates to receive work and surrounding adjacent surfaces are in accordance with Air Barrier Manufacturer published literature prior to installation of fluid applied membrane air barrier assembly.
2. Sheathing panels must be securely fastened and installed flush to ensure a continuous substrate in accordance with Air Barrier Manufacturer published literature.
3. Fastener penetrations must be set flush with sheathing and fastened into solid backing.
4. Mortar joints in concrete block and form tie holes/voids in poured concrete shall be filled, flush, smooth, and allowed to be cured for a minimum of twenty-four (24) hours.
5. New concrete should be cured for a minimum of sixteen (16) hours after forms are removed.
6. Cap and protect exposed back-up walls against wet weather conditions prior to application of fluid applied membrane air barrier assembly.

- B. Notify contractor in writing of any conditions that are not acceptable.
- C. The installing contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this section in accordance with published literature. Commencement of Work or any parts thereof shall mean installer acceptance of the substrate.

PREPARATION

- A. All surfaces must be sound, dry to touch, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
- B. Protect adjacent surfaces not included in scope of Work to prevent spillage and overspray.
- C. Hot weather or direct-sun applications over porous substrates, such as concrete, promote rapid surface drying and can form blisters in the fluid applied membrane air barrier during curing. To aid in blister prevention prepare substrate in accordance with one of the following optional procedures:
 - 1. Prime coat:
 - a. Apply a thin prime coat of fluid applied membrane air barrier to substrate.
 - b. Allow fluid applied membrane air barrier to fully cure prior to subsequent application.
 - c. Install primary fluid applied membrane air barrier to Air Barrier Manufacturer minimum recommended mil thickness.
 - 2. Two coat:
 - a. Apply fluid applied membrane air barrier to achieve one-half (1/2) of Air Barrier Manufacturer minimum recommended mil thickness.
 - b. Allow fluid applied membrane air barrier to fully cure prior to subsequent application.
 - c. Apply fluid applied membrane air barrier to achieve one-half (1/2) of Air Barrier Manufacturer minimum recommended mil thickness.
 - d. Overall dry mil thickness shall be in accordance with Air Barrier Air Barrier Manufacturer published literature.

INSTALLATION

- A. Ensure substrate is ready to receive fluid applied membrane air barrier in accordance with published literature.
- B. If fluid applied membrane air barrier should freeze while in storage, move containers to a controlled environment above 32 degrees F (0 degrees C) until thawed and re-mix using a hand operated power mixer prior to use.
- C. Fluid applied membrane air barrier shall not be applied when ambient (air) and substrate temperatures are below 20 degrees F (-6 degrees C).
- D. Do not proceed with application of air barrier membrane when rain is expected within 16 hours.

- E. Apply sealant at sharp corners, changes in substrate plane, penetrations, and edges to form a smooth transition from one plane to another.
- F. Non-Moving Substrate Joint and Crack Treatment:
 - 1. Gaps equal to or less than 3/8 inch (10 mm) wide:
 - a. Sheathing Joint Sealant:
 - 1) Apply sealant at rate recommended by Air Barrier Manufacturer.
 - 2) Spread sealant at joint extending a minimum one (1) inch beyond gap to ensure a continuous air and watertight assembly.
 - 2. Gaps equal to or less than 1/2 inch (12 mm) wide:
 - a. Building Envelope Sealant:
 - 1) Apply sealant at rate recommended by Air Barrier Manufacturer.
 - 2) Spread sealant at joint extending a minimum one (1) inch on each side of substrate gap.
 - b. Liquid applied flashings:
 - 1) Apply liquid applied flashing at rate recommended by Air Barrier Manufacturer.
 - 2) Apply liquid applied flashing in accordance with Air Barrier Manufacturer published literature extending a minimum of two (2) inches on each side of substrate gap.
 - c. Self-adhering flashings:
 - 1) Apply primer to substrate and allow curing in accordance with published literature prior to installation of self-adhered flashing.
 - 2) Apply self-adhering flashing in accordance with Air Barrier Manufacturer published literature extending a minimum of three (3) inches on each side of substrate gap.
 - 3) Roll membrane with countertop roller to eliminate air pockets between self-adhered flashing and substrate ensuring full adhesion of membrane onto substrate.
 - 4) Seal exposed leading edges of self-adhered membrane with sealant.
 - 3. Gaps greater than 1/2 inch wide:
 - a. Contact Air Barrier Manufacturer.
 - 4. Refer to Air Barrier Manufacturer published literature for a complete list of authorized Non-Moving Substrate Joint and Crack Treatment details.
- G. Moving Joints:

1. Contact Air Barrier Manufacturer.
- H. Refer to Air Barrier Manufacturer detail drawings for installation procedures including, but not limited to, the following:
1. Inside corners
 2. Outside corners
 3. Crack treatment
 4. Penetrations
 5. Rough openings
 6. Control joints
 7. Expansion joints
 8. Changes in substrate
- I. Contact Air Barrier Manufacturer to coordinate transition of fluid applied membrane air barrier to adjacent areas including, but not limited to, the following:
1. Roof to air barrier
 2. Air barrier to waterproofing
 3. Fastener penetrations
- J. Thru-Wall Flashing:
1. Coordinate with Section 07 46 46
- K. Primary Liquid Air Barrier Membrane
1. Install fluid applied membrane air barrier in accordance with Air Barrier Manufacturer published literature to ensure an air and watertight fluid applied membrane air barrier assembly.
 2. Fluid applied membrane air barrier assembly must be installed in a monolithic application without sags, runs or voids, and transitioning with auxiliary components to create a uniform drainage plane and air barrier.
 3. Install fluid applied membrane air barrier and transition membranes so that subsequent membrane installation laps one (1) inch (2.5 cm) onto existing membrane ensuring an air and watertight fluid applied membrane air barrier assembly.
 4. Fluid applied membrane air barrier total dry thickness shall be in accordance with Air Barrier Manufacturer published literature. Refer to Air Barrier Manufacturer Technical Data Sheet.
- L. Insulation Adhesive:

1. Coordinate with Section 07 21 00 for insulating materials.
2. Upon curing of the air barrier membrane system apply insulation adhesive in a serpentine pattern.
3. Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.
4. Fully butter all joints of insulation panels with adhesive during installation, with the exception of expansion joints.

FIELD QUALITY CONTROL

- A. Final Observation and Verification:
 1. Final inspection of fluid applied membrane air barrier assembly shall be carried out by the Owner's representative, the contractor, or Air Barrier Manufacturer as required by warranty.
 2. Contact Air Barrier Manufacturer for warranty issuance requirements.
- B. Fluid applied membrane air barrier assembly is not designed for permanent UV exposure. Refer to Air Barrier Manufacturer published literature for product limitations.

CLEANING

- A. Promptly as the Work proceeds, and upon completion, clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.
- B. Clean soiled surfaces, spatters, and damage caused by Work of this Section.
- C. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

END OF SECTION

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SECTION 07 41 13 - METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed steel panels.
- B. Prefinished aluminum soffit panels

1.02 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 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.
- C. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012, with Editorial Revision (2015).

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
- F. Test Reports: Indicate compliance of metal roofing system to specified requirements.
- G. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

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- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of five years from Date of Substantial Completion.
- C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of five years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Manufacturer: Drexel Metals Inc,
 - 2. Series: 200S Profile
 - 3. Seam: Mechanical Double Lock

2.02 METAL ROOF PANELS

- A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Steel Panels:
 - a. Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 coating.
 - b. Steel Thickness: Minimum 24 gage (0.024 inch).
 - 2. Profile: Standing seam, with minimum 2.0 inch seam height; concealed fastener system lapped seam in standing seam profile.
 - 3. Texture: Smooth.

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4. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so that each sheet spans over three or more supports.
5. Width: Maximum panel coverage of 18 inches.
6. Mill-Finish Steel Panels: Treat with passivating chemical prior to shipment, to inhibit formation of corrosion.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.04 FABRICATION

- A. Panels: Provide factory or field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.05 FINISHES

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer's standard line.

2.06 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- C. Sealants:
 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
 3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

- D. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 - 2. Sheet Thickness: 22 mil, 0.022 inch minimum total thickness.
 - 3. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 - 5. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
- E. Coverboard: Primed fiberglass mat-faced cover board complying with ASTM C 1177.
 - 1. Basis of design: DensDeck Prime
 - 2. Thickness: .25 inch
- F. Roof Air Barrier:
 - 1. Basis of design: Carlisle - VapAir Seal 725 TR
 - 2. Thickness: 40 Mils (ASTM D1970)
 - 3. Tensile Strength: 250 psi (ASTM D412)
 - 4. Elongation: 250% (ASTM D412)
 - 5. Peel Adhesion: 5 lbs/in (ASTM D903)
 - 6. Permeability: 0.015 perms (ASTM D1970)
- G. Snow Guards
 - 1. Basis of design: S-5 Universal Clamp with ColorGard Metal Roof Snow Bar.
 - 2. Color: As selected from manufacturers full range

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- B. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.
- C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- D. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
 - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 - 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
- C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
 - 1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.
 - 2. Incorporate concealed clips at panel joints, and apply snap-on battens to provide weathertight joints.
 - 3. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

3.04 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 42 13 - METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for exterior wall panels and soffit panels, with related flashings and accessory components.

1.02 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 A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data - Wall and Soffit Panels: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components shown on shop drawings.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.
- D. Samples: Submit two samples of wall panel and soffit panel, 12 inches by 12 inches in size illustrating finish color, sheen, and texture.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in installing products specified in this section with minimum three years of documented experience.

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1.05 MOCK-UPS

- A. Construct mock-up, full height of mechanical screen wall long enough to be fully supported by structural members, include corner detail and top and bottom of screen wall trim details.
- B. Mock-up may not remain as part of work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Wall Panels - Concealed Fasteners:
 - 1. ATAS International, Inc: www.atas.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Soffit Panels:
 - 1. ATAS International, Inc: www.atas.com/#sle.

2.02 METAL WALL PANEL SYSTEM

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 - 1. Provide exterior wall panels.
 - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - 3. Maximum Allowable Deflection of Panel: $L/180$ for length(L) of span.
 - 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.

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5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
7. Corners: Factory-fabricated in one continuous piece with minimum 2-inch returns.

B. Exterior Wall Panels:

1. Profile: Vertical and horizontal, as indicated; style as indicated.
 - a. Horizontal Panels;
 - 1) ATAS; Design Wall
 - 2) Profile: DSF120
 - 3) Color: As Selected from manufacturers Full Range
 - b. Vertical Panels;
 - 1) ATAS; Design Wall
 - 2) Profile: DSH120 (10 up 2 down)
 - 3) Color: As Selected from manufacturers Full Range
2. Side Seams: , .
3. Color: As indicated on drawings.

C. Soffit Panels:

1. Profile: Style as indicated, with venting not provided.
 - a. ATAS; Design Wall
 - b. Profile: DWF120
 - c. Color: As Selected from manufacturers Full Range
2. Material: Precoated aluminum sheet, 20 gauge, 0.032 inch minimum thickness.
3. Color: As indicated on drawings.

D. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

E. Expansion Joints: Same material, thickness and finish as exterior sheets; ___ gauge, ___ inch thick; manufacturer's standard brake formed type, of profile to suit system.

F. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

G. Anchors: Galvanized steel.

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2.03 MATERIALS

- A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.
- B. Precoated Aluminum Sheet: ASTM B209/B209M, 3105 alloy, O temper, with smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.04 FINISHES

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer's standard line.

2.05 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
 - 1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.

3.02 INSTALLATION

- A. Install panels on structural framing in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow to dry prior to wall panel installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends 2 inches, minimum.

3.03 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

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3.04 PROTECTION

- A. Protect metal wall panels until completion of project.
- B. Touch-up, repair, or replace damaged wall panels or accessories before Date of Substantial Completion.

END OF SECTION

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SECTION 07 46 46 - FIBER-CEMENT SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiber-cement siding.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Siding substrate.
- B. Section 05 40 00 - Cold-Formed Metal Framing: Water-resistive barrier under siding.
- C. Section 07 25 00 - Weather Barriers: Weather barrier under siding.
- D. Section 09 91 13 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets; 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.
- D. Test Report: Applicable model code authority evaluation report (e.g. ICC-ES).
- E. Installer's Qualification Statement.
- F. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.
- G. Warranty: Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.
- H. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

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1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum three years of experience.

1.06 MOCK-UP

- A. Construct a fiber-cement mock-up panel as shown in the bid documents; include all flashing, accessories, and rainscreen attachment furring.
- B. Locate where dire

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Provide multi-year manufacturer warranty as indicated under Siding article sub-heading "Warranty".
- D. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions.
www.edacontractors.com/#sle

PART 2 PRODUCTS

2.01 FIBER-CEMENT SIDING

- A. Trim: Individual board made of polymetic blend, fly ash, and glass fiber formed under high pressure with integral surface texture.
 - 1. Texture: Smooth
 - 2. Length: [12] ft, nominal
 - 3. Width: As indicated on drawings
 - 4. Finish: Factory applied primer.
 - 5. Warranty: 30 year limited.
 - 6. Manufacturers:
 - a. Basis of Design: James Hardie HZ10.

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2.02 ACCESSORIES

- A. Trim: Same material and texture as siding.
- B. Fiber-Cement Siding Metal Trim: Extruded aluminum alloy 6063-T5 temper.
 - 1. Dimension and Layout: As indicated on drawings.
 - 2. Color: As selected by Architect.
- C. Rainscreen Attachment System (CI System): Drainable thermally broken Horizontal & Vertical CI-Girt to support rainscreen. See section 07 48 00
- D. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch.
- E. Insect Barrier: Cor-A-Vent SV-3 Siding Vent for Rain Screens
- F. Sealant: Elastomeric, polyurethane or silyl-terminated polyether/polyurethane, and capable of being painted.
- G. Finish Paint: Latex house paint acceptable to siding manufacturer; primer recommended by paint manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Install Sheet Metal Flashing:
 - 1. Above door and window trim and casings.
 - 2. Above horizontal trim in field of siding.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
 - 1. Read warranty and comply with terms necessary to maintain warranty coverage.
 - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.

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3. Use trim details indicated on drawings.
 4. Touch up field cut edges before installing.
 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Steel Studs: Use hot-dipped galvanized self-tapping screws, with the points of at least three screws penetrating each stud the panel crosses and at panel ends.
 - C. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.
 - D. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
 - E. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.
 - F. Finish Painting: Refer to Section 09 91 13.
 - G. Finish Painting: Within one week after installation, paint siding and trim with one coat primer and two coats finish paint.

3.04 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	07 46 46 - 4	Fiber-Cement Siding

SECTION 07 48 00 - RAINSCREEN ATTACHMENT SYSTEM (CI SYSTEM)

PART 1 GENERAL

1.01 SUMMARY

- A. Provide a thermally broken, rainscreen attachment system for attachment of exterior cladding fiber-cement siding installed over continuous exterior-insulation.
- B. Related Sections:
 - 1. Refer to Division 05 Section "Steel Stud Framing".
 - 2. Refer to Division 06 Section "Rough Carpentry" for wood framing.
 - 3. Refer to Division 06 Section "Sheathing".
 - 4. Refer to Division 07 Section "Air Barrier"
 - 5. Refer to Division 07 Section "Fiber-Cement-Siding".
 - 6. Refer to Division 07 Section "Thermal Insulation" for exterior continuous insulation.

1.02 SYSTEM DESCRIPTION

- A. System assembly shall include the following components from the substrate out:
 - 1. Substrate: Metal stud wall framing assembly and sheathing
 - 2. Weather Resistant/Air Barrier over sheathing
 - 3. Continuous insulation.
 - 4. Thermally broken rainscreen attachment system.
 - 5. Exterior cladding.
- B. Design Requirements:
 - 1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
 - 2. Employ registered professional engineer, licensed to practice engineering in jurisdiction where Project is located, to engineer each component of rainscreen attachment system.
 - 3. Structural Design: Exterior-insulated rainscreen wall assembly capable of withstanding effects of load and stresses from dead loads, wind loads, ice loads (if applicable) as indicated on Structural General Notes on Structural Drawings, and normal thermal movement without evidence of permanent defects of assemblies or components.
 - a. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum ambient temperatures by preventing overstressing of components and other detrimental effects:

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- 1) Temperature Change (range): 120 degrees Fahrenheit (67 degrees C), ambient:
4. Support Framing/Attachment System:
 - a. No framing component may penetrate the layer of continuous exterior insulation other than thermally isolated fasteners.
 - b. Frequency and spacing of stiffened horizontal girts as indicated by manufacture in project specific engineering package.
- C. Performance Requirements:
1. No thermal bridges other than fasteners and service openings.
 2. Structural Performance:
 - a. Wind Load Performance – Attachment system must show the following results when tested in accordance with ASTM E330-02.
 - 1) 90 pound per square foot negative and positive pressure held for 60 seconds, system components shall not experience failure or gross permanent distortion.
 - 2) 135 pound per square foot negative and positive pressure held for 10 seconds, system components shall not experience failure or gross permanent distortion.
 - b. Wind cycling (air pressure cycling) performance – Attachment system must show conformance to the following results when tested in accordance with ASTM E1886-05.
 - 1) A total of 4,500 air pressure cycles. Cycles must include 50 cycles at a maximum pressure of 90 pounds both positive and negative. Average cycle time must not be less than 3.25 seconds for both negative and positive cycles. Cladding weight supported during test must be a minimum of 11.5 pounds per square foot. No damage or deformation must be seen at end of test.
 - c. Gravity load (dead load) performance – Attachment system must demonstrate resistance to deflection under shear loading, applied parallel to the wall assembly and directly to the attachment system. Testing must be conducted using calibrated equipment by an IAS accredited third party laboratory. Deflection not to exceed 0.050 inches at 150 pounds per square foot.
 3. Framing Members:
 - a. Test framing components to AAMA TIR- A8-[04] – Section 7.2 to determine structural performance and effective moment of inertia for each perforated component. Minimum Effective Moment of Inertia: 0.0066 in⁴.
 - b. Localized bending stress for eccentrically loaded framing members must be evaluated with the maximum effective length of resisting element not more than 12 inches.
 4. Fasteners:

- a. Minimum Safety Factor of 3 for both tension and shear values
- b. Combined tension and shear shall be evaluated according to an interaction formula. Sum of terms shall not exceed 1.0.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and descriptions of testing performed on system components to indicate meeting or exceeding specified performance.
- B. Shop Drawings:
 - 1. Submit connection details to the cladding manufacturer, showing interface of rainscreen attachment system to substrate and panels with adjacent construction, signed and sealed by Professional Engineer.
 - 2. Show system installation and attachment, including fastener size and spacing.
- C. Samples: Submit following material samples for verification:
 - 1. Vertical Girts: Two (2) 12-inch long samples.
 - 2. Horizontal Girts: Two (2) 12-inch long samples.
 - 3. Installation method per requirements of mock-up panel.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Minimum 5 years' experience specializing in the manufacturing of façade attachment/support framing similar to those specified.
 - 2. Ability to demonstrate conformance to testing requirements.
- B. Installer Qualifications:
 - 1. Minimum of 3 years' documented experience or minimum of 5 completed projects of equivalent scope and quality and recommended by manufacturer to perform work of this Section.
 - 2. Onsite superintendent or foreman overseeing installation on site during entire work of this Section with experience equivalent to installer and in good standing with the manufacturer.
- C. Pre-Installation Meeting:
 - 1. Discuss sequence and scheduling of work and interface with other trades.
 - 2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
 - 3. Review and document methods, procedures and manufacturer's installation guidelines and safety procedures for exterior wall assembly.

- D. Mock-Ups: Coordinate mock-up materials and requirements with mock-up specified in Division 01

1.05 QUALITY CONTROL

- A. Single source responsibility:
 - 1. Furnish engineered rainscreen attachment system components under direct responsibility of single manufacturer.
- B. Field Measurements: Verify actual supporting and adjoining construction before fabrication.
- C. Record field measurements on project record shop drawings.
- D. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of rainscreen attachment system corresponding to established dimensions.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials and components in manufacturers' original, unopened and undamaged containers or bundles, fully identified. Exercise care to avoid damage during unloading, storing and installation.
- B. Store, protect and handle materials and components in accordance with manufacturer recommendations to prevent damage, contamination and deterioration. Keep materials clean, dry, and free of dirt and other foreign matter, and protect from damage due to weather or construction activities.

1.07 SEQUENCING

- A. Ordering: Comply with manufacturers' ordering instructions and lead time requirements to avoid construction delays.
- B. Coordinate construction to ensure that assemblies fit properly to supporting and adjoining construction; coordinate schedule with construction in progress to avoid delaying work.

1.08 WARRANTY

- A. Manufacturer Warranties:
 - 1. Attachment System: Ten (10) year Limited Warranty.
 - a. Covers components of the attachment system, including structural failure of components when all the materials and components are supplied and installed per manufacturer's requirements.
 - b. Includes labor and material for removal and replacement of defective material.
 - c. Includes labor to remove and reinstall façade finish panels, finish closures and façade finish accessories necessary to access defective material.

- B. Contractor's Warranties: 2-year labor warranty, starting from Substantial Completion, to cover repair of materials found to be defective as a result of installation errors.
- C. Limitation of Warranties: Exclude repairs, replacement, and corrective work to the substrate, primary structure, finish panels, and/or property – unless otherwise noted above. Warranties exclude mechanical damage due to abuse, neglect, primary structure failure, or forces of nature greater than normal weather conditions.

PART 2 PRODUCTS

2.01 RAINSCREEN ATTACHMENT/SUPPORT FRAMING SYSTEM

- A. Comply with ANSI/ASHRAE 90.1-2010 definition of continuous insulation (c.i.).
- B. Coating Material: ASTM A1046, Zinc-Aluminum-Magnesium, minimum thickness ZM40.
 - 1. ASTM A653 Galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.
- D. Spacing: Comply with manufacturer's Professional Engineers calculations.
- E. Horizontal Girt System:
 - 1. Minimum 0.046-inch thick (18 gauge) cold-formed steel with pre-punched drainage holes, attached through continuous rigid insulation directly to substrate with thermal isolating washers and fasteners.
 - a. Profile Depth: 3/4-inch
 - b. Fastening Face Width: 2 inches.
 - c. Finish: [Mill finish]
 - d. Basis of Design: Knight Wall Systems HCI-GIRT.
 - 2. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.
 - a. Coating Material: ASTM A1046, Zinc-Aluminum-Magnesium, minimum thickness ZM40.
 - b. ASTM A653 Galvanized steel is not acceptable.
 - 3. Fasteners:
 - a. General: Provide manufacturer's recommended non-corrosive type of sufficient strength to provide solid attachment through rigid insulation to structural substrate.
 - 1) Minimum 1,000-hour salt-spray coating (ASTM B117).
 - b. Thermal Isolating Barrel: Barrel style wall anchor for securing girt through continuous insulation to substrate.
 - 1) Material: Polycarbonate

2) Design Intent: To help the air barrier/water resistive barriers sealing around the wall anchors blind penetration.

3) Basis of Design: Knight Wall Systems ANKIT™

c. Fastening Face, Width: 2-inches Min.

F. Vertical Girt System:

1. Minimum 0.046-inch thick (18 gauge) cold-formed steel with pre-punched drainage holes, attached through continuous rigid insulation directly to substrate with thermal isolating washers and fasteners.

a. Profile Depth: 3/4-inch

b. Fastening Face Width: 2 inches.

c. Finish: [Mill finish]

d. Basis of Design: Knight Wall Systems CI-GIRT.

2. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.

a. Coating Material: ASTM A1046, Zinc-Aluminum-Magnesium, minimum thickness ZM40.

b. ASTM A653 Galvanized steel is not acceptable.

3. Fasteners:

a. General: Provide manufacturer's recommended non-corrosive type of sufficient strength to provide solid attachment through rigid insulation to structural substrate.

1) Minimum 1,000-hour salt-spray coating (ASTM B117).

b. Thermal Isolating Barrel: Barrel style wall anchor for securing girt through continuous insulation to substrate.

1) Material: Polycarbonate
Design Intent: To help the air barrier/water resistive barriers sealing around the wall anchors blind penetration.

2) Basis of Design: Knight Wall Systems ANKIT™
Fastening Face, Width: 2-inches Min.

G. Soffit Z-Girt: Stiffened thermally broken z-girt with pre-punched drainage and attachment holes, directly attached through exterior wall sheathing to metal stud framing with engineered thermally isolated washer assembly and fasteners.

1. Steel Thickness: Minimum 0.046-inch thick (18 gauge).

2. Profile Depth: 2.5" (depending on location).

3. Fastening Face: 1 3/4" inches.

4. Basis of Design: ThermaZee by Knight Wall Systems.

5. Or approved equal.

H. Accessories:

1. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

2.02 SIDING/CLADDING PANEL

A. Refer to Division 07 Section 07 46 46.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with manufacturer requirements for installation conditions affecting performance of the work.
- B. Field verify architectural details and mechanical and electrical requirements prior to commencing installation.
- C. Commencement of installation constitutes acceptance of existing conditions and acceptance of responsibility for satisfactory performance.

3.02 RAINSCREEN ATTACHMENT SYSTEM INSTALLATION

A. Installation

- 1. Install in strict accordance with manufacturer's installation instructions.
- 2. Use laser or chalk line to mark starting height of horizontal girt
- 3. Do not use shims to plumb the wall between the girts and insulation.
- 4. Minimum length of installed cut girt is 24-inches and shall be attached with at least two (2) fasteners.
- 5. Mount vertical girts, fastened up to 32 inches on center (as determined by the manufactures engineering calculations) over installed rigid insulation, using one wall anchor per pre-punched attachment hole at spacing indicated on engineering calculations.
 - a. Check plumb of vertical girts both parallel and perpendicular to the structure.
 - b. Tighten screws that attach vertical girt through insulation to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
 - c. Where obstructions are present and unavoidable (i.e. window openings), use laser or chalk line to restart girt.
 - d. Locate vertical girt at jamb conditions and outside corner conditions.

- e. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
 - f. The systems components should not be cut while installed on the building, unless using a shearing instrument.
 - g. Replace thermal isolator pieces that break during installation.
 - h. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of vertical girts are installed.
6. Mount horizontal girts, fastened up to 36 inches on center (as determined by the manufactures engineering calculations) over installed rigid insulation, using one self-tapping screw with thermal isolator, for each pre-punched attachment hole at spacing indicated on engineering calculations.
- a. Check plumb of horizontal girts both parallel and perpendicular to the structure.
 - b. Tighten screws that attach horizontal girt through insulation to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
 - c. Where obstructions are present and unavoidable (i.e. window openings), use laser or chalk line to restart girt.
 - d. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
 - e. The systems components should not be cut while installed on the building, unless using a shearing instrument.
 - f. Replace thermal isolator pieces that break during installation.
 - g. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of horizontal girts are installed.

3.03 SIDING/CLADDING PANEL INSTALLATION – REFER TO SECTION 07 46 46.

- A. The cavity must be clear and free from air flow and drainage obstructions.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and other items indicated in Schedule.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- D. CDA A4050 - Copper in Architecture - Handbook; Current Edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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, in size illustrating material of typical standing seam.
- D. Samples: Submit two samples 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. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 3 years of documented experience.

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.

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- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Stainless Steel: ASTM A666/A666M, Type 304 alloy, soft temper, 26 gage, 0.0188 inch thick; smooth No. 4 - Brushed finish.

2.02 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.04 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 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.

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3.02 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.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

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SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including copings.

1.02 RELATED REQUIREMENTS

- A. Section 07 72 00 - Roof Accessories: Snow guards.

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; 2017.
- C. NRCA (RM) - The NRCA Roofing Manual; 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, 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 appropriately sized samples of coping.
- E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Copings: Factory fabricated to sizes required; mitered, welded corners; 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.
 - 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: Formed steel sheet, galvanized, 24 gage, 0.024 inch thick, minimum.
 - 4. Finish: 70 percent polyvinylidene fluoride.

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5. Color: As indicated on drawings.

2.02 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

2.03 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.
 1. Refer to Section 07 72 00 for information on roofing related accessories.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.
- F. Coordinate installation of flashing flanges into reglets.

END OF SECTION

SECTION 07 71 23 - MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.

1.02 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. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 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.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.
- D. Samples: Submit two samples, 6 inch long illustrating component design, finish, color, and configuration.

1.05 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.

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PART 2 PRODUCTS

2.01 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
 - 1. Finish: Plain, shop pre-coated with PVDF (polyvinylidene fluoride) coating.

2.02 COMPONENTS

- A. Gutters: Profile as indicated on drawings.
- B. Downspouts: Profile as indicated on drawings
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
- D. Fasteners: Galvanized steel , with soft neoprene washers.

2.03 ACCESSORIES

- A. Downspout Boots: Cast iron; ASTM A48.
 - 1. Manufacturer: Basis of Design: Zurn
 - 2. Model No: Z191.

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. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

- A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/16 inch per foot , 0.5 percent minimum.
- D. Connect downspouts to storm sewer system. Grout connection watertight.

END OF SECTION

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SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Snow guards.

1.02 RELATED REQUIREMENTS

- A. Section 07 41 13 - Metal Roof Panels.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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.
 - 1. Snow Guards: Submit design calculations for loadings and spacings based on manufacturer testing.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.04 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.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

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PART 2 PRODUCTS

2.01 SNOW GUARDS

- A. Fence Type Snow Guard: Continuous snow guard; manufacturer's standard channel, set in brackets or posts, with optional plates and metal trim to match roof.
 - 1. Basis of Design; S-5 GolorGard w/ S-5 univernal stainless steel bracket
 - 2. Brackets: Stainless steel.
 - 3. Continuous Rail: Finished to match roof.
 - a. Outside Dimensions, Square: 1 inch, nominal.
 - b. Sleeve Couplings: As recommended by manufacturer.
 - c. End Collars and Caps: Metal to match tube.
 - 4. Clamps for Standing Seam Roof: Stainless steel clamps attached to standing seams of roof panels; for attachment of fence type snow guard.
 - a. Seam Profile: Selected by Architect from manufacturer's full range; match profile of metal roof.

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.

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B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2017.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2018.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2018.
- F. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.
- H. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.

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6. Substrates for which laboratory adhesion and/or compatibility testing is required.
 7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 8. Sample product warranty.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
 - D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
 - E. Installation Plan: Submit at least four weeks prior to start of installation.
 - F. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
 - G. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
 - H. Installation Log: Submit filled out log for each length or instance of sealant installed.
 - I. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
 - J. Manufacturer's Qualification Statement.
 - K. 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 the work of this section and with at least three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Installation Plan: Include schedule of sealed joints, including the following.
 1. Installation Log Form: Include the following data fields, with known information filled out.
 - a. Date of installation.
 - b. Name of installer.
 - c. Actual joint width; provide space to indicate maximum and minimum width.
 - d. Actual joint depth to face of backing material at centerline of joint.
 - e. Air temperature.

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- E. Field Quality Control Plan:
 - 1. Field testing agency's qualifications.
 - 2. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- F. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
 - 1. Record results on Field Quality Control Log.
 - 2. Repair failed portions of joints.
- G. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1.06 MOCK-UP

- A. install joint sealants in mock-up panel to verify color selection by architect

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.

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- a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - c. Other joints indicated below.
- 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
 - 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
 - 2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
 - 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 - 2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
 - 3. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
 - 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 - 5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

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2.03 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Service Temperature Range: Minus 20 to 180 degrees F.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
 - 3. Service Temperature Range: Minus 40 to 180 degrees F.
- D. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
 - 1. Movement Capability: Plus and minus 35 percent, minimum.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
 - 3. Service Temperature Range: Minus 40 to 180 degrees F.
- E. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
- F. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

2.04 SELF-LEVELING SEALANTS

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Open Cell: 40 to 50 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.

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- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.
- J. Partitions: Seal all penetrations through partitions that extend to deck above with acoustical sealant.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- B. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames; 2022.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- H. ASTM C1199 - Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods; 2014.
- I. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2019.
- J. ASTM E1423 - Standard Practice for Determining the Steady State Thermal Transmittance of Fenestration Systems; 2014.
- K. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- L. NAAMM HMMA 867 - Guide Specifications for Laminated Core Hollow Metal Doors and Frames; 2016.
- M. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2019.
- N. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- O. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2022.
- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- Q. NFRC 102 - Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems; 2026.
- R. NFRC 400 - Procedure for Determining Fenestration Product Air Leakage; 2023.

- S. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- T. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- U. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

- A. Section Includes:
 - 1. Standard and custom hollow metal doors and frames.
- B. Related Sections:
 - 1. Division 01 Section "General Conditions".
 - 2. Division 04 Section "Masonry".
 - 3. Division 06 Section "Rough Carpentry".
 - 4. Division 06 Section "Finish Carpentry".
 - 5. Division 08 Section "Operations and Maintenance".
 - 6. Division 08 Section "Flush Wood Doors".
 - 7. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
 - 8. Division 08 Section "Glazing".
 - 9. Division 08 Section "Door Hardware".
 - 10. Division 09 Sections "Painting".
 - 11. Division 26 Section "Electrical".
 - 12. Division 28 Section "Integrated Access Control Hardware Devices".
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
 - 2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.

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3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. SDI-113 Standard Practice for Determining the Steady-State Thermal Transmittance of Steel Door & Frame Assemblies.
10. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
11. ASTM C1199 - Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods
12. ASTM E1423 - Practice for Determining Steady State Thermal Transmittance of Fenestration Systems.
13. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
14. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
15. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
16. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
17. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
18. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
19. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

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- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of anchorages, joints, field splices, and connections.
 - 6. Details of accessories.
 - 7. Details of moldings, removable stops, and glazing.
 - 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
 - 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C (neutral pressure at 40" above sill) or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
 - 1. CECO Door Products (C).

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2. Curries Company (CU).

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A653/A653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.03 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A653/A653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
 - 3. Core Construction: Manufacturer's thermally enhanced QMax core. Where indicated provide doors fabricated as thermal-rated assemblies with a minimum thermal rating of 0.35 BTU/hr-ft²-F.
 - 4. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
 - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 - 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 - 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A1008/A1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
1. Curries Company (CU) - Polystyrene Core - 707 Series.
 2. Curries Company (CU) - QMax Core - 707 Series.

2.04 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A653/A653M, Coating Designation A60.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Manufacturers Basis of Design:
 - a. Curries Company (CU) - Mercury 3 Thermal Break TQ Series.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A1008/A1008M.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Manufacturers Basis of Design:

- a. Curries Company (CU) - C Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.05 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
 - 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.06 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.07 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
 - 2. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
5. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
7. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on-center and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

- 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
8. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
9. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.08 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.03 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.05 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION

SECTION 08 31 05 - ACCESS DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling mounted access units.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.
- E. Manufacturer's Qualification Statement.
- F. Project Record Documents: Record actual locations of each access unit.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with Air Infiltration requirements of Section 13 0505.20 - Common Work Requirements For Cleanroom Products

2.02 WALL MOUNTED ACCESS UNITS

- A. Wall mounted units: Factory fabricated door and frame, fully assembled units wiht corner joints welded, fill and ground flush, square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Material: Steel, factory primed.
 - 2. Finish: Field painted.
 - 3. Size: As noted on the drawings.
 - 4. Hardware:
 - a. Latch: Screw driver slot for quarter turn cam latch.

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2.03 CEILING MOUNTED ACCESS UNITS

- A. Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Material: Stainless steel, Type 304.
 - 2. Stainless Steel Finish: No. 4 brushed finish.
 - 3. Size: As noted on the drawings.
 - 4. Hardware:
 - a. Latch/Lock: Screw driver slot for quarter turn cam latch.
 - b. Gasketing: Continuous around perimeter of door panel to limit air Inltration to less than 0.01 cfm/sq foot – ASTM E 283
 - 1) Location: Cleanrooms, hospital controlled environment rooms, smoke walls and where indicated.
 - 2) Air Inltration to less than 0.01 cfm/sq foot – ASTM E 283

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 80 00 - 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 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- 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 B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- G. 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).
- 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.
- 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).

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1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and 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. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- H. Designer's Qualification Statement.
- I. Manufacturer's Qualification Statement.
- J. Installer's Qualification Statement.
- K. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

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 three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 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.

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1.08 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.

1.09 WARRANTY

- A. See Section 01 78 00 - 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. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: KAWNEER.

2.02 FRAMING FOR INSULATING GLAZING (EXTERIOR GLAZED LOCATIONS)

- A. Basis of Design: Kawneer 601TT
- B. Center-Set Style, Thermally-Broken:
 - 1. Vertical Mullion Dimensions: 2 inches wide by 6 inches deep.
 - 2. Finish: Anodized
 - 3. Color: Dark Bronze

2.03 FRAMING FOR MONOLITHIC GLAZING (INTERIOR GLAZED LOCATIONS)

- A. Basis of Design: Kawneer 450
- B. Front-Set Style:
 - 1. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
 - 2. Finish: Anodized
 - 3. Color: Dark Bronze

2.04 BASIS OF DESIGN -- SWINGING DOORS

- A. Wide Stile, Insulating Glazing, Thermally-Broken:
 - 1. Thickness: 1-3/4 inches.
 - 2. Finish: Anodized

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3. Color: Dark Bronze

2.05 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 1. Finish: Anodized
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 2. Finish Color: Permanodic Dark Bronze
 3. 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.
 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 5. 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.
 6. 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.
 7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 9. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
 10. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.
- B. Performance Requirements:
 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.

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- b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- 2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
- 3. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
- 4. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.06 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Framing members for interior applications need not be thermally broken.
 - 2. Glazing Stops: Flush.
- B. Glazing: As specified in Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches.
 - 2. Glazing Stops: Square.
 - 3. Finish: Same as storefront.

2.07 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209 (ASTM B209M).
- C. Fasteners: Stainless steel.
- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.08 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C21A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.
- B. Color: As indicated on drawings.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.09 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.

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- B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
 - 1. Finish on Hand-Contacted Items: Polished chrome.
 - 2. For each door, include butt hinges, pivots, push handle, pull handle, exit device, narrow stile handle latch, and closer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
- K. 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.

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3.04 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.
- B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as indicated on drawings.
 - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
- C. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.06 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. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed curtain wall, with vision glazing and glass and metal infill panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 80 00 - Glazing.

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; 2014.
- 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.
- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- 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 B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- E. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2018.
- F. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- G. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).
- H. 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.

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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 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.
- 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. Samples: Submit two samples illustrating finished aluminum surface, glazing, and glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure.
 - 1. Calculations shall be signed and sealed by a Professional Engineer licensed in the jurisdiction that the project is located in.
- G. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
- H. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- I. Designer's Qualification Statement.
- J. Manufacturer's Qualification Statement.
- K. Installer's Qualification Statement.
- L. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at 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.

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1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
 1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-ups.
- B. Provide ____by____ feet mock-up including each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
- C. Locate off-site where directed, and remove when directed.

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 78 00 - 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. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Kawneer Clearwall - SSI & SBI systems
 1. Kawneer Company - Clearwall Curtain Wall System

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2.02 CURTAIN WALL

- A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Basis Of Design: Kawneer Clearwall Curtain Wall System
 - a. Clearwall SS (Screw Spline)
 - 1) Clearwall (SSI)
 - (a) Width: 2 1/2 inches
 - (b) Depth: 6 inches
 - (c) Outside glazed with metal interfaced insulating glass.
 - b. Clearwall SB (Shear Block)
 - 1) Clearwall (SBI)
 - (a) Width: 2 1/2 inches
 - (b) Depth: 11 inches
 - (c) Outside glazed with metal inferraced insulating glass.
 - 2. Finish: Color anodized with organic seal.
 - a. Color: Permanodic Dark Bronze
 - b. Factory finish surfaces that will be exposed in completed assemblies.
 - c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 - 3. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 5. 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.
 - 6. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.
- B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
 - 1. Design Wind Loads: Comply with the requirements of ASCE 7

2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with requirements of ASCE 7.
3. Movement: Accommodate the following movement without damage to components or deterioration of seals:
 - a. Expansion and contraction caused by 180 degrees F surface temperature.
 - b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
 - c. Movement of curtain wall relative to perimeter framing.
 - d. Deflection of structural support framing, under permanent and dynamic loads.
- C. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
 1. Test Pressure Differential: 10 psf.
- D. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283/E283M at 6.27 psf pressure differential across assembly.
- E. Thermal Performance Requirements:
 1. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
- B. Glazing: As specified in Section 08 80 00.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Firestopping: As specified in Section 07 84 00.
- C. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.
- D. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, and compatible with flashing material.
- E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- F. Glazing Accessories: As specified in Section 08 80 00.

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2.05 FINISHES

- A. Factory Finishing:
 - 1. Basis of Design
 - a. Kawneer Permanodic AA-M10C21A44, AAMA 611, Architectural CClass I color Anodic Coating (Color #29 Black)
- B. Color: As indicated on drawings.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other related work.
- B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

- A. Install curtain wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Install firestopping at each floor slab edge.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. 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 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

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- C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. Provide services of curtain wall manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 01 40 00 - Quality Requirements, for general testing and inspection requirements.
- C. Water-Spray Test: Provide water spray quality test of installed curtain wall components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as indicated on drawings.
 - 2. Conduct tests in each area prior to 35 percent completion of this work.
- D. Provide field testing of installed curtain wall system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as indicated on drawings.
 - 2. Conduct tests prior to installation of interior drywall so that future concealed conditions are visible for leaks and infiltration.
 - 3. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
 - 4. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
 - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
 - 5. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.
 - a. Maximum allowable rate of air leakage is 0.09 cfm/sq ft.
- E. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 ADJUSTING

- A. Adjust operating sash for smooth operation.

3.06 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, take care to remove dirt from corners, and wipe surfaces clean.

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- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.
- B. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2017.
- C. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- E. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.
- F. BHMA A156.6 - American National Standard for Architectural Door Trim; 2015.
- G. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2017.
- H. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2018.
- I. BHMA A156.18 - American National Standard for Materials and Finishes; 2016.
- J. BHMA A156.36 - American National Standard for Auxiliary Locks; 2016.
- K. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- M. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2019.
- O. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- P. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Q. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- R. UL 437 - Standard for Key Locks; Current Edition, Including All Revisions.
- S. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- T. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.
- U. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

V. UL 305 - Standard for Panic Hardware; Current Edition, Including All Revisions.

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.

1.03 SUMMARY

- A. This Section includes commercial door hardware for the following:
1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
1. Mechanical door hardware.
 2. Electromechanical door hardware.
 3. Cylinders specified for doors in other sections.
- C. Related Sections:
1. Division 01 Section "General Conditions".
 2. Division 06 Section "Rough Carpentry".
 3. Division 06 Section "Finish Carpentry".
 4. Division 08 Section "Operations and Maintenance".
 5. Division 08 Section "Door Hardware Schedule".
 6. Division 08 Section "Hollow Metal Doors and Frames".
 7. Division 08 Section "Flush Wood Doors".
 8. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
 9. Division 26 Section "Electrical".
 10. Division 28 Section "Integrated Access Control Hardware Devices".
- D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 2. ICC (IBC) International Building Code.
 3. NFPA 70 - National Electrical Code.
 4. NFPA 80 - Fire Doors and Windows.
 5. NFPA 101 - Life Safety Code.

6. NFPA 105 - Installation of Smoke Door Assemblies.
 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 - Access Control System Units.
 4. UL 305 - Panic Hardware.
 5. ANSI/UL 437- Key Locks.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.

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- g. Door and frame sizes and materials.
 - h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
- 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
- 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.05 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

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1.06 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s),

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Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.08 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.09 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.02 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

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- a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
- a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
5. Manufacturers:
- a. Hager Companies (HA) - BB Series, 5-knuckle.
 - b. McKinney (MK) - TA/T4A Series, 5-knuckle.
 - c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.03 DOOR OPERATING TRIM

- A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
- 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Pulls shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 - 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
 - 6. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.04 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA).
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 - 4. Tubular deadlocks and other auxiliary locks.
 - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 6. Keyway: Manufacturer's Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
 - 1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
 - 2. Manufacturers:
 - a. Sargent (SA) - Degree DG1.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. New System: Key locks to a new key system as directed by the Owner.
- F. Key Quantity: Provide the following minimum number of keys:

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1. Change Keys per Cylinder: Two (2)
 2. Master Keys (per Master Key Level/Group): Five (5).
 3. Construction Keys (where required): Ten (10).
- G. Construction Keying: Provide construction master keyed cylinders.
- H. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Schlage (SC) - L9000 Series.

2.06 DEADLOCKS AND LATCHES

- A. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8" diameter bolts.
1. Manufacturers:
 - a. Adams Rite Manufacturing (AD) - 4900 Series.

2.07 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

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4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.08 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL 305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide exit devices with functions and features as follows:
 - a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
 - b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
 - c. No catch points: addition of applied deflectors or other added components are not allowed.
 - d. No visible plastic.
 - e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
 - f. Constructed of all stainless steel.
 - g. Stainless steel pullman type latch with deadlock feature.
 - h. Narrow or wide style exterior trim as specified in the hardware sets.
 - i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
 - j. Ten-year limited warranty for mechanical features.
 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.
 - b. Sargent Manufacturing (SA) - PE80 Series.

2.09 SMALL BUSINESS ACCESS CONTROL SOLUTIONS

- A. Small Business Access Control Smart Readers: Readers that enable unlocking of openings with electrified hardware via Bluetooth low energy credentials and pin-code access. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide readers with functions and features as follows:
 - a. Meets A117.1 Accessibility Code and is FCC/IC certified.

- b. Bluetooth mobile access, Seos card or FOB access.
 - c. Two dry contact relays; first relay triggers immediately with approved access, second relay has a programmable delay of 0-30 seconds to trigger automatic operator on delay.
 - d. Certified IP65 weather rating with operating temperature of -40°F to 150°F.
 - e. Dedicated power source recommended; 12-24 VDC with relays tested up to 2 amps.
 - f. Frame mount, wall mount, or J-box mount options with simple installation; 2 screws and back plate.
 - g. Two-year electronic, mechanical and finish warranty.
2. Manufacturers:
- a. Centrios (CE) - CER Series.
- B. Small Business Access Control Kits: Where specified provide kits with access control hardware appropriate for the application. Listed manufacturers shall meet all functions and features as specified herein.
1. Kits shall include the following products as appropriate for each opening.
- a. Centrios Access Control Reader.
 - b. Electric Strike.
 - c. Power Supply.
 - d. Request to exit station with hand-wave motion activation.
 - e. Door Position Switch.
2. Manufacturers:
- a. Centrios (CE).

2.10 SURFACE DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
- 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 - 2. Standards: Closers to comply with UL 10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 - 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use.

Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 30-year warranty.
 2. Manufacturers:
 - a. LCN Closers (LC) - 4040 Series.
 - b. Norton Rixson (NO) - 7500 Series.
 - c. Sargent Manufacturing (SA) - 351 Series.

2.11 OVERHEAD CONCEALED DOOR CLOSERS

- A. Door Closers, Overhead Concealed (Narrow Profile): ANSI/BHMA 156.4 Grade 1 Certified Products Directory (CPD) listed overhead concealed door closers designed for narrow profile frames and doors. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide overhead concealed doors closers with functions and features as follows:
 - a. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies and A117.1 Accessibility Code.
 - b. Single acting, offset hung with a cast iron body.
 - c. Fully concealed body in the frame head and track assembly in the door.
 - d. Separate and independent valves for closing speed and backcheck adjustments.
 - e. Five-year limited warranty.
 2. Manufacturers:
 - a. dormakaba (DO) - RTS88 Series.

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- b. LCN Closers (LC) - 2030 Series.
- c. Norton Rixson (NO) - 91DCP Series.

2.12 ARCHITECTURAL TRIM AND ACCESSORIES

- A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1" less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.
 - 1. Provide protective trim with functions and features as follows:
 - a. Meets ADA requirements for smooth bottom door surfaces.
 - b. UL Classified options for use on fire-rated doors up to 3 hours.
 - c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
 - d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
 - e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
 - f. Fasteners included; adhesive-backed options available for select models.
 - g. Ten-year limited warranty.
 - 2. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.13 DOOR STOPS AND HOLDERS

- A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood (RO).
 - c. Trimco (TC).

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2.14 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL 10C.
 - 1. Provide intumescent seals as indicated to meet UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.15 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 3280 Series.
 - b. Security Door Controls (SD) - DPS Series.
 - c. Securitron (SU) - DPS Series.

2.16 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.

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3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
 - E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
 - F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.

- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Manufacturer's Abbreviations:

1. MK - MCKINNEY
2. SA - SARGENT
3. AD - ADAMS RITE
4. RO - ROCKWOOD
5. NO - NORTON RIXSON
6. PE - PEMKO
7. CE - CENTRIOS
8. SU - SECURITRON
9. OT - OTHER

HARDWARE SETS

SET: 1.0

DOORS: 107A

3 HINGE (HEAVY WEIGHT) T4A3386 US32D MK

1 PADDLE OPERATOR 4591 628 AD

1 DEADLATCH 4900 628 AD

1 CORE DG1 6300 US15 SA

1 PULL RM2320 MTG-TYPE 1XHD US32D RO

1 CONCEALED CLOSER 91N 90N 689 NO

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

1 RAIN GUARD 346C PE

1 SWEEP (W/ DRIP EDGE) 3452CNB PE

1 THRESHOLD 252X3AFG MSES25SS PE

1 READER KIT CER-7400-628 CE

1 WIRING DIAGRAM ELEVATION AND POINT TO POINT AS SPECIFIED OT

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NOTES:

- PERIMETER/MEETING STILE SEALS BY FRAME/DOOR SUPPLIER.
- ELECTRONIC OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTERING A VALID CODE RELEASES ELECTRIC STRIKE ALLOWING ENTRY OR KEY RETRACTS LATCHBOLT. FREE EGRESS AT ALL TIMES BY PADDLE. IN CASE OF POWER LOSS, DOOR REMAINS LOCKED AND LATCHED.
- DOOR POSITION SWITCH, MOTION SENSOR AND POWER SUPPLY INCLUDED IN THE KIT.

SET: 2.0

DOORS: 101A, 116A, 117, 118A, 118C

4 HINGE (HEAVY WEIGHT) T4A3386 US32D MK

1 RIM EXIT DEVICE, STOREROOM DG164 16 PE8504 US32D SA

2 CORE DG1 6300 US15 SA

1 PULL RM2320 MTG-TYPE 1XHD US32D RO

1 CONCEALED CLOSER 91N 90N 689 NO

1 RAIN GUARD 346C PE

1 SWEEP (W/ DRIP EDGE) 3452CNB PE

1 THRESHOLD 252X3AFG MSES25SS PE

1 POSITION SWITCH DPS2-M/W-BK (TO SUIT) SU

NOTES:

- PERIMETER AND MEETING STILE GASKET BY DOOR / FRAME MANUFACTURER.

SET: 3.0

DOORS: 130

3 HINGE (HEAVY WEIGHT) T4A3386 US32D MK

1 STOREROOM LOCK DG164 8204 LNMD US26D SA

1 CORE DG1 6300 US15 SA

1 SURFACE CLOSER 351 CPS EN SA

1 KICK PLATE K1050 10" CSK US32D RO

1 RAIN GUARD 346C PE

1 GASKETING (HEAD/JAMBS) S773BL PE

1 SWEEP (W/ DRIP EDGE) 3452CNB PE

1 THRESHOLD 252X3AFG MSES25SS PE

SET: 4.0

DOORS: 124A, 124B

3 HINGE, FULL MORTISE TA2714 US26D MK

1 OFFICE LOCK DG164 8205 LNMD US26D SA

1 CORE DG1 6300 US15 SA

1 CONCEALED CLOSER 91N 90N 689 NO

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

NOTES:

• PERIMETER/MEETING STILE SEALS BY FRAME/DOOR SUPPLIER.

SET: 5.0

DOORS: 101B, 116B

4 HINGE, FULL MORTISE TA2714 US26D MK

2 PULL RM2300 MTG-TYPE 5HD US32D RO

1 CONCEALED CLOSER 91N 90N 689 NO

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

NOTES:

• PERIMETER/MEETING STILE SEALS BY FRAME/DOOR SUPPLIER.

SET: 6.0

DOORS: 108, 120A, 120B, 121A

3 HINGE, FULL MORTISE TA2714 US26D MK

1 STOREROOM LOCK DG164 8204 LNMD US26D SA

1 CORE DG1 6300 US15 SA

1 SURFACE CLOSER 351 O/P9 (TO SUIT) EN SA

1 KICK PLATE K1050 10" CSK US32D RO

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

3 SILENCER 608/609 (TO SUIT) RO

SET: 7.0

DOORS: 107B, 111, 112

3 HINGE, FULL MORTISE TA2714 US26D MK

1 OFFICE LOCK DG164 8205 LNMD US26D SA

1 CORE DG1 6300 US15 SA

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

3 SILENCER 608/609 (TO SUIT) RO

SET: 8.0

DOORS: 110, 113, 121B

3 HINGE, FULL MORTISE TA2714 US26D MK

1 CLASSROOM LOCK DG164 8237 LNMD US26D SA

1 CORE DG1 6300 US15 SA

1 SURFACE CLOSER 351 O/P9 (TO SUIT) EN SA

1 KICK PLATE K1050 10" CSK US32D RO

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

3 SILENCER 608/609 (TO SUIT) RO

SET: 9.0

DOORS: 118B

3 HINGE, FULL MORTISE TA2714 US26D MK

1 CLASSROOM SECURITY INTRUDER LOCK DG164 8238 LNMD US26D SA

2 CORE DG1 6300 US15 SA

1 SURFACE CLOSER 351 O/P9 (TO SUIT) EN SA

1 KICK PLATE K1050 10" CSK US32D RO

1 DOOR STOP 403/441CU (TO SUIT) US26D RO

3 SILENCER 608/609 (TO SUIT) RO

SET: 10.0

DOORS: 105, 106

3 HINGE, FULL MORTISE TA2714 US26D MK

1 PRIVACY LOCK V21 8265 LNMD US26D SA

1 SURFACE CLOSER 351 O/P9 (TO SUIT) EN SA

1 KICK PLATE K1050 10" CSK US32D RO

1 MOP PLATE K1050 4" CSK US32D RO
 1 DOOR STOP 403/441CU (TO SUIT) US26D RO
 3 SILENCER 608/609 (TO SUIT) RO
 1 COAT HOOK RM802 US32D RO
 SET: 11.0
 DOORS: 109
 3 HINGE, FULL MORTISE TA2714 US26D MK
 1 PASSAGE LATCH 8215 LNMD US26D SA
 1 KICK PLATE K1050 10" CSK US32D RO
 1 DOOR STOP 403/441CU (TO SUIT) US26D RO
 3 SILENCER 608/609 (TO SUIT) RO
 SET: 12.0
 DOORS: 122, 123
 3 HINGE, FULL MORTISE TA2714 US26D MK
 1 PULL RM2300 MTG-TYPE 1 US32D RO
 1 PUSH PLATE 70C US32D RO
 1 SURFACE CLOSER 351 O/P9 (TO SUIT) EN SA
 1 KICK PLATE K1050 10" CSK US32D RO
 1 MOP PLATE K1050 4" CSK US32D RO
 1 DOOR STOP 403/441CU (TO SUIT) US26D RO
 3 SILENCER 608/609 (TO SUIT) RO
 END OF SECTION

SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.

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.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- F. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- H. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- 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; 2010.
- K. GANA (GM) - GANA Glazing Manual; 2008.
- L. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.
- M. GANA (SM) - GANA Sealant Manual; 2008.
- N. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).

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- O. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2017.
- P. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2020.
- Q. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch minimum in size of glass units.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

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1.07 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.
- B. Provide on-site glazing mock-up with the specified glazing components.
- C. Locate where directed.
- D. Mock-ups may remain as part of the Work.

1.08 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

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2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 1. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
 2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
 4. Patterned Glass Type: ASTM C1036, Type II - Patterned Flat Glass, Quality - Q5, Form 3 - Patterned glass, with color and performance characteristics as indicated.
 5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.03 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 3. Metal Edge Spacers: Aluminum, bent and soldered corners.
 4. Spacer Color: Black.
 5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 6. Color: Black.
 7. Purge interpane space with dry air, hermetically sealed.
 8. Capillary Tubes: Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet between point of fabrication and point of installation to permit pressure equalization of air space.
 - a. Capillary Tubes: Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.

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- b. Inert gas may be installed in the field into air space in accordance with insulating glass fabricator's and installer's requirements.
- B. Type IGU-1 - Insulating Glass Units: Vision glass, double glazed.
 - 1. Basis of Design: Viracon 1" insulating VNE30-63
 - 2. Applications: Exterior glazing unless otherwise indicated.
 - 3. Space between lites filled with air.
 - 4. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Per basis of design.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 5. Inboard Lite: Fully tempered safety glass, 1/4 inch thick, minimum.
 - a. Tint: Per basis of design.
 - 6. Total Thickness: 1 inch.
 - 7. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal. Summer - Center of Glass: 0.26, nominal.
 - 8. Visible Light Transmittance (VLT): 46 percent, nominal.
 - 9. Shading Coefficient (SC): 0.27, nominal.
 - 10. Solar Heat Gain Coefficient (SHGC): 0.24, nominal.
 - 11. Visible Light Reflectance, Outside: 8 percent, nominal. Interior: 11 percent, nominal.
 - 12. Light to Solar Gain (LSG): 1.92
 - 13. Solar Energy: 17%
 - 14. Glazing Method: Dry glazing method, gasket glazing.

2.04 GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
 - 1. Applications: Interior glazing unless otherwise indicated.
 - 2. Glass Type: Fully tempered safety glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch, nominal.

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2.05 ACCESSORIES

- A. Setting Blocks: Silicone, with 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 by width of glazing rabbet space minus 1/16 inch by 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. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- 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 on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - STRUCTURAL SILICONE GLAZING

- A. Application - Field Glazed: Follow basic guidelines of structural silicone glazing for glazing application.
- B. Provide design review of the glazing system and project details, adhesion testing, proper surface preparation, training and a quality service program.
- C. Provide only structural silicone sealant, tested and manufactured for structural glazing.

3.06 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.

3.07 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 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.

- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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SECTION 08 91 00 - LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.02 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. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012 (Reapproved 2015).
- C. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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.
- G. Maintenance Data: Include lubrication schedules, adjustment requirements.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

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1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.
 - 1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 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. 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.
 - 3. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
 - 4. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.
 - 5. Free Area: Ref. mechanical drawings.
- B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction.
 - 1. Blades: Straight.
 - 2. Frame: 4 inches deep, channel profile; corner joints mitered and , with continuous recessed caulking channel each side.
 - 3. Steel Thickness, Galvanized: Frame 16 gage, 0.0598 inch minimum base metal; blades 16 gage, 0.0598 inch minimum base metal.
 - 4. Steel Finish: Superior performing organic coating, finished after fabrication.

2.02 MATERIALS

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- B. Stainless Steel: ASTM A666/A666M, Type 304, soft temper, smooth surface, No. 4 brushed finish.

2.03 FINISHES

- A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70

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percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

- B. Color: As selected from manufacturer's standard colors.

2.04 ACCESSORIES

- A. Blank-Off Panels: Same material as louver, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Bird Screen: Interwoven wire mesh of steel, 14 gage, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.
- D. Insect Screen: 18 x 16 size aluminum mesh.
- E. Fasteners and Anchors: Stainless steel.
- F. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- G. 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. Set sill members and sill flashing in continuous bead of sealant.
- D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- E. Secure louver frames in openings with concealed fasteners.
- F. Coordinate with installation of mechanical ductwork.

3.03 ADJUSTING

- A. Adjust operable louvers for freedom of movement of control mechanism. Lubricate operating joints.

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3.04 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION

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SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Acoustic insulation.
- C. Sheathing.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Acoustic (sound-dampening) wall and ceiling board.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Structural steel stud framing.
- B. Section 09 22 16 - Non-Structural Metal Framing.
- C. Section 09 30 00 - Tiling: Tile backing board.

1.03 REFERENCE STANDARDS

- A. 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; 2018.
- B. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2019.
- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2019b.
- C. 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; 2018.
- D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- E. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019.
- F. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

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- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- I. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- J. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
- K. GA-226 - Application of Gypsum Board to Form Curved Surfaces; 2025.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 3 years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.02 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.

4. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
5. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
- B. Backing Board for Wet Areas: Reference Section 09 30 00 - Tiling.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.
- D. Exterior Sheathing Board: Glass mat faced gypsum board; ASTM C1177/C117M, square long edged, 5/8" thick.

2.03 GYPSUM WALLBOARD ACCESSORIES

- A. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
 1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 2. Tape Thickness: 1/4 inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Water-Resistive Barrier: As specified in Section 07 27 26.
- D. 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.
- E. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 1. Corner Beads: Low profile, for 90 degree outside corners.
 2. Expansion Joints:
 - a. Type: V-shaped metal with factory-installed protective tape.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

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1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 2. Joint Compound: Setting type, field-mixed.
- G. High Build Drywall Surfer: 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.
- H. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- I. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
1. Place one bead continuously on substrate before installation of perimeter framing members.
 2. Place continuous bead at perimeter of each layer of gypsum board.
 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
1. Identification: Fire rated walls shall be identified above finished ceilings per VUSBC Section 703.7. Letters shall be no smaller than one inch in height and indicate the fire

resistance rating of the wall assembly and type of assembly. Identification shall be provided at intervals of no more than eight feet.

- D. Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
 - 1. Install mold-resistant Gypsum Board at all walls adjacent to plumbing fixtures, within 2 feet above and to each side of the plumbing fixture and continuous from fixture to floor.
- E. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.
- F. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: If not indicated, place control joints consistent with lines of building spaces and as follows:
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. 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 3: Walls to receive textured wall finish.
 - 4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 5. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
 - a. Fire rated walls shall be identified above finished ceilings per VUSBC Section 703.7. Letters shall be no smaller than one inch in height and indicate the fire resistance rating of the wall assembly and type of assembly. Identification shall be provided at intervals of no more than eight feet.

- 6. Level 0: Temporary partitions.
- 7. Level 0: Surfaces indicated to be finished in later stage of project.
- D. 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.
- E. 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. Construct a 8'x8' mock-up for approval. If approved, the mock-up may remain as part of the work.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition and ceiling framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- D. 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; 2018.
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.
- F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2018.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- I. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- J. ASTM E413 - Classification for Rating Sound Insulation; 2016.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.

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2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
- C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 5 psf where tiling occurs and L/240 at 5 psf elsewhere. Where specific Tile Council of North America (TCNA) installation methods are scheduled having stricter requirements, adhere to the specified method requirements.
 1. Studs: C shaped with flat or formed webs with knurled faces. The minimum base metal thickness for all studs shall be 30 Mils.
 2. Runners: U shaped, sized to match studs.
 3. Ceiling Channels: T-bar; heavy-duty.
 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
- B. 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 braced with continuous bridging on both sides.
- C. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
- D. Preformed Top Track Firestop Seal:
 1. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
- E. Non-Loadbearing Framing Accessories:
 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

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2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
 - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
 - b. Height: 35-3/4 inches.
 3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
 4. Sheet Metal Backing: 0.036 inch thick, galvanized.
 5. Fasteners: ASTM C1002 self-piercing tapping screws.
 6. Anchorage Devices: Powder actuated.
 7. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.
 - a. Where exposed provided insulation with a Flame Spread Index = 25 or less and a Smoke Development Index = 450 or less as tested per ASTM E 84.
 8. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- F. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 2. Tape Thickness: 1/4 inch.

2.02 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

- A. Comply with requirements of ASTM C754.
- B. Extend partition framing to structure where indicated and to ceiling in other locations.

- C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- D. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- E. Where tile finish is scheduled, install studs to meet the TCA design assembly deflection criteria.
- F. Align and secure top and bottom runners at 24 inches on center.
- G. At partitions indicated with an acoustic rating:
 - 1. Provide components and install as required to produce STC ratings as indicated, based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
 - 2. Place one bead of acoustic sealant between runners and substrate , studs and adjacent construction.
 - 3. Place one bead of acoustic sealant between studs and adjacent vertical surfaces.
 - 4. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- H. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- I. Install studs vertically at spacing indicated on drawings.
- J. Align stud web openings horizontally.
- K. Secure studs to tracks using crimping method. Do not weld.
- L. Stud splicing is not permissible.
- M. Fabricate corners using a minimum of three studs.
- N. Install double studs at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- O. Brace stud framing system rigid.
- P. Coordinate erection of studs with requirements of door frames; install supports and attachments.
- Q. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- R. Blocking: Use steel channels secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, opening frames, and similar items.

1. Reference drawings for typical detail.
- S. Sound Isolation Clips: Mechanically attach to framing or structure with fasteners recommended by clip manufacturer. Install at spacing indicated on drawings.
- T. Furring: Coordinate with sound isolation clip spacing and locations. Lap splices a minimum of 6 inches.

3.03 CEILING AND SOFFIT FRAMING

- A. Comply with requirements of ASTM C754.
- B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- C. Install furring independent of walls, columns, and above-ceiling work.
- D. Securely anchor hangers to structural members or embed them in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- E. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- G. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.
- H. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.
- I. Laterally brace suspension system.

3.04 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet.
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet.
- C. Where tile finish is scheduled, install studs to meet the TCNA installation method deflection criteria.
- D. For tiles wall locations having tiles with at least on edge 15" in length, maximum allowable variation is 1/8" in 10 feet from the required plane, with no more than 1/16" variation in 24" when measured from the high points in the surface.

END OF SECTION

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SECTION 09 30 00 - TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Cementitious backer board as tile substrate.
- D. Non-ceramic trim.

1.02 REFERENCE STANDARDS

- A. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.
- B. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- C. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.
- D. ANSI A108.5 - Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue Plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar; 2023.
- E. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.
- F. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2024).
- G. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.
- H. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).
- I. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- J. ANSI A108.12 - Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Modified Dry-Set Mortar; 2023.
- K. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).

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- L. 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; 2017.
- M. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017.
- N. ANSI A108.1b - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.
- A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.
- B. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- D. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- E. ICC-ES AC308 - Acceptance Criteria for Termite Physical Barrier Systems; 2014, with Editorial Revision (2017).
- F. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2019.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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.
- C. Samples: Provide full size samples of each scheduled product.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than 10 of each type.

1.04 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

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C. Installer Qualifications:

1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.05 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
 1. Minimum size of mock-up is indicated on drawings.
 2. Approved mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 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 TILE

- A. Manufacturers: As scheduled on the drawings.

2.02 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim: Finish as scheduled, style and dimensions as indicated on drawings, for setting using tile mortar or adhesive.
 1. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Wall corners, outside and inside.
 - d. Transition between floor finishes of different heights.
 - e. Thresholds at door openings.
 - f. Floor to wall joints.
 - g. Borders and other trim as indicated on drawings.
 2. Manufacturers: As scheduled on the drawings.

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2.03 SETTING MATERIALS

- A. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.

2.04 GROUTS

- A. Manufacturers:
 - 1. Selections are indicated on the drawings.
- B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
 - 1. Applications: Typical unless noted otherwise.
 - 2. Color(s): As selected by Architect from manufacturer's full line.

2.05 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
 - 1. Applications: Between tile and plumbing fixtures.
 - 2. Color(s): As selected by Architect from manufacturer's full line.

2.06 ACCESSORY MATERIALS

- A. Underlayment at Floors: Specifically designed for bonding to thin-set setting mortar; not primarily a waterproofing material and having the following characteristics:
 - 1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
 - 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC308.
 - 3. Uncoupling Function: Allow for separation between membrane and the mortar adhering tile to the membrane when subjected to excessive substrate movement.
 - 4. Type: Thin-Set Mortar Adhered Sheet.
- B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- 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 tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

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- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with Section 09 05 61.
 - 2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.
 - 3. Follow moisture and alkalinity remediation procedures in Section 09 05 61.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install 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 a feather edge.
- E. 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 A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations; including spacing and locations of control joints.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings. If no pattern is shown, then lay out tile so they are centered in each direction, with no less than half a tile on each side.
- C. Avoid cutting horizontal edge of tiles.
- D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- E. 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.
- F. Form internal angles square and external angles square.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Install thresholds where indicated.
- I. At wainscots, use nearest full tile to the dimension shown on the elevations. If cutting is necessary, always place the cut tile at the bottom of the wall.

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- J. Sound tile after setting. Replace hollow sounding units.
- K. Keep control and expansion joints free of mortar, grout, and adhesive.
- L. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- M. Grout tile joints unless otherwise indicated.
- N. 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.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 INSTALLATION - WALL TILE

- A. On exterior walls install in accordance with TCNA (HB) Method W244, thin-set over cementitious backer units, with waterproofing membrane.
- B. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.
- C. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Supplementary acoustical insulation above ceiling.

1.02 REFERENCE STANDARDS

- A. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019 (Reapproved 2025).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- C. 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; 2024a.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2019.

1.03 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.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit two samples 4 X 4 inch in size illustrating material and finish of both the acoustical diensional units.
- D. Samples: Submit two samples each, 6 inches long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Manufacturer's Qualification Statement.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

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1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Acoustic Tiles/Panels: As scheduled on the drawings.
- B. Dimensional Felt Panels: As scheduled on drawings.
 - 1. Basis of Design: Arcade, By TURF as indicated on the drawings.
- C. Linear Plank Felt Panels: As scheduled on drawings
 - 1. Basis of Design: Linear, By TURF as indicated on drawings.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. As scheduled on the drawings.

2.03 SUSPENSION SYSTEMS

- A. Manufacturer's standard solution or as scheduled on the drawings.

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-gage 0.08 inch galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Perimeter Moldings: Same metal and finish as grid.
 - 1. Size: As required for installation conditions.
 - 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- E. Acoustical Insulation: Specified in Section 07 21 00.
 - 1. Thickness: 2 inch.

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2. Size: To fit acoustical suspension system.
 3. Insulation shall have a Smoke Development Index = 450 or less and a Flame Spread Index = 25 or less as tested per ASTM E 84.
- 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.

3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.
- C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, and ASTM E580/E580M and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- 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.

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- I. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- 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.
- 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. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions as indicated.
- I. Install hold-down clips on panels within 20 ft of an exterior door.

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.

END OF SECTION

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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. Verification Samples: Submit manufacturer's complete set of color samples for Architect's verification.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.04 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.

1.05 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.

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; as scheduled.
 - 1. Height: As scheduled.
 - 2. Thickness: 0.125 inch.

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3. Finish: Satin.
4. Accessories: Premolded external corners, internal corners, and end stops.

PART 3 EXECUTION

3.01 EXAMINATION

- A. 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.

3.02 PREPARATION

- A. Clean substrate.

3.03 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

END OF SECTION

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SECTION 09 68 13 - TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

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PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile Carpeting: As scheduled on the drawings.

2.02 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum, _____ color.
- C. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 61 16.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- 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 carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Trim carpet tile neatly at walls and around interruptions.
- G. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

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SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Fiber Cement Siding and Trim.
 - 2. Exterior Hollow Metal Doors and Frames.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise 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. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

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4. Manufacturer's installation instructions.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 1. Where sheen is specified, submit samples in only that sheen.
 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
 3. Apply full paint system to each sample, including all coats specified.

1.04 QUALITY ASSURANCE

1.05 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

1.06 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, 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.

1.07 FIELD 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. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Provide paints and finishes from the same manufacturer to the greatest extent possible.
- C. Paints:
 1. Base Manufacturer: Sherwin Williams.
- D. Primer Sealers: Same manufacturer as top coats.

E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
1. Provide paints and finishes 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- C. Colors: As indicated on drawings.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete, concrete masonry units, brick, fiber cement siding, primed wood, primed metal, and fiber cement trim.
1. Two top coats and one coat primer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to 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 for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

3.02 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise 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, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Floors, unless specifically indicated.
 - 8. Ceramic and other tiles.
 - 9. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 10. Glass.
 - 11. Concrete masonry units in utility, mechanical, and electrical spaces.
 - 12. Acoustical materials, unless specifically indicated.
 - 13. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

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- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- F. SSPC-SP 2 - Hand Tool Cleaning; 2024.
- G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
 - 3. Apply full paint system to each sample, including all coats specified.

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 three years experience and approved by manufacturer.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

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- B. Provide panel, 8 feet long by 8 feet wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Mock-up may remain as part of the work.

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, 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.

1.09 FIELD 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. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Base Manufacturer: Sherwin Williams..
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes 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.

3. 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.
 4. 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.
 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: As indicated on drawings.

2.03 PAINT SYSTEMS - INTERIOR

- A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
1. Two top coats and one coat primer.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. 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. Plaster and Stucco: 12 percent.
 - 3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 - 5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to 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 repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- 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. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- J. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- K. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.

2. Shop-Primed Surfaces: 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. Re-prime entire shop-primed item.
 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- L. 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.
- M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.
 1. Where touch up is required on walls with an egg shell finish, re-paint the entire wall.

END OF SECTION

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SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High performance coatings.
- B. Surface preparation.

1.02 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
- C. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection.
 - 1. Provide samples for each type of paint system and in each color and gloss. Apply full paint system to each sample, including all coats specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance Data: Include cleaning procedures and repair and patching techniques.

1.04 QUALITY ASSURANCE

1.05 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 coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

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- C. Coating 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.

1.06 FIELD CONDITIONS

- A. Do not install materials when temperature is below 55 degrees F or above 90 degrees F.
- B. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- D. Restrict traffic from area where coating is being applied or is curing.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide high performance coating products from the same manufacturer to the greatest extent possible.
- B. High-Performance Coatings:
 - 1. Basis of Design: Sherwin-Williams Company: www.protective.sherwin-williams.com/industries/#sle.
 - 2. Substitutions: Section 01 60 00 - Product Requirements.

2.02 TOP COAT MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
- B. Epoxy Coating for Exposed AESS Structural Steel:
 - 1. Top Coat(s): High Performance Institutional, Two-Component, Water Based Epoxy Coating; MPI #254.
 - a. Sheen: Eggshell.
 - b. Products:
 - 1) Sherwin-Williams; Pro Industrial Water Based Catalyzed Epoxy; MPI #254: www.protective.sherwin-williams.com/#sle.
 - 2) Substitutions: Section 01 60 00 - Product Requirements.

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	09 96 00 - 2	High-Performance Coatings

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

3.02 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.03 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in "MPI Architectural Painting and Specification Manual".
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

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 surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

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3.07 PROTECTION

- A. Protect finished work from damage.

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	09 96 00 - 4	High-Performance Coatings

SECTION 10 14 00 - SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Emergency evacuation maps.
- C. Building identification signs.

1.02 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.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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 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. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- G. Manufacturer's Qualification Statement.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Curved Sign Media Suction Cups: for removing media.

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	10 14 00 - 1	Signage

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 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. Store tape adhesive at normal room temperature.

1.06 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.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 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.
 - 4. Sign Height: 2 inches, unless otherwise indicated.
 - 5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
 - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
 - 7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
 - 8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
 - 9. Building Exits: Provide Exit identification sign with braille, omit room numbering.

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- C. Emergency Evacuation Maps:
 - 1. Allow for one map.
- D. Building Identification Signs:
 - 1. Use individual metal letters.
 - 2. Mount on outside wall in location indicated on drawings.

2.02 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Square.
 - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Radius / Curved Signs: One-piece, curved extruded aluminum media holder securing flat, flexible sign media by curved lip on two sides; other two sides closed by end caps; concealed mounting attachment.
 - 1. Sizes: As indicated on drawings.
 - 2. Finish: Natural (clear) anodized.
 - 3. Sign Orientation: Curved in horizontal section.
 - 4. Wall Mounting of One-Sided Signs: Mechanical anchorage, with predrilled holes, and set in clear silicone sealant.
- C. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: Clear.
 - 4. Character Color: Contrasting color.

2.03 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 - 1. Total Thickness: 1/16 inch.

2.04 DIMENSIONAL LETTERS

- A. Metal Letters:
 - 1. Mounting: Concealed screws.

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2.05 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Tape Adhesive: Double sided tape, permanent adhesive.

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 and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 21 13.17 - PHENOLIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Phenolic toilet compartments.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Concealed steel support members.
- B. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- B. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

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 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- D. Samples: Submit two samples of partition panels illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Phenolic Toilet Compartments:
 - 1. ASI Global Partitions; ____: www.asi-globalpartitions.com/#sle.
 - 2. Substitutions: Section 01 60 00 - Product Requirements.

2.02 PHENOLIC TOILET COMPARTMENTS

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid phenolic core panels with integral melamine finish, ceiling-hung.

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	10 21 13.17 - 1	Phenolic Toilet Compartments

1. Color: Single color as indicated on the drawings.

2.03 ACCESSORIES

- A. Head Rails: Hollow anodized aluminum, 1 inch by 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.
- B. Wall and Pilaster Brackets: Polished stainless steel; manufacturer's standard type for conditions indicated on drawings.
- C. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
- D. Hardware: Polished stainless steel:
 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 2. Door Latch: Slide type with exterior emergency access feature.
 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch 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.

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- 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.

3.05 SCHEDULES

- A. Restrooms 113 and 114: Ceiling mounted type; single color as selected.

END OF SECTION

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SECTION 10 26 00 - WALL PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Protective wall covering.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
 - 1. Submit two samples of protective wall covering, 6 by 6 inches square.

PART 2 PRODUCTS

2.01 PRODUCT TYPES

- A. Protective Wall Panels:
 - 1. Material: As indicated on the drawings.

2.02 FABRICATION

- A. Fabricate components with tight joints, corners and seams.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as indicated on drawings.
- C. Verify that substrate surfaces for adhered items are clean and smooth.
- D. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

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3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

END OF SECTION

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	10 26 00 - 2	Wall Protection

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Accessories for toilet rooms, showers, and utility rooms.
- D. Diaper changing stations.
- E. Utility room accessories.

1.02 REFERENCE STANDARDS

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).
- B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- E. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Samples: Submit two samples of each accessory, illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	10 28 00 - 1	Toilet, Bath, and Laundry Accessories

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Bobrick Contura Series, unless noted otherwise.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.
- B. Stainless Steel Sheet: ASTM A666/A666M, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- E. Adhesive: Two component epoxy type, waterproof.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.
- D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- E. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface mounted, for coreless type rolls.
- B. Paper Towel Dispenser: Folded paper type, stainless steel, semi-recessed, with viewing slots on sides as refill indicator and tumbler lock.
 - 1. Capacity: 300 C-fold minimum.
- C. Combination Towel Dispenser/Waste Receptacle: Recessed flush with wall, stainless steel; seamless wall flanges, continuous piano hinges.
 - 1. Waste receptacle liner: Reusable, heavy-duty vinyl.

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2. Towel dispenser capacity: 400 C-fold.
 3. Waste receptacle capacity: 4 gallons.
- D. Soap Dispenser: Liquid soap dispenser, deck-mounted on vanity, with polyethylene container concealed below deck; piston and 4 inch spout of stainless steel with bright polished finish; chrome-plated deck escutcheon.
1. Minimum Capacity: 16 ounces.
- E. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
1. Minimum Capacity: 48 ounces.
- F. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
1. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
- G. Seat Cover Dispenser: Stainless steel, surface-mounted, reloading by concealed opening at base, tumbler lock.
- H. Grab Bars: Stainless steel, smooth surface.
1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
 2. Heavy Duty Grab Bars: Floor supports are acceptable if necessary to achieve load rating.
 - a. Push/Pull Point Load: Minimum 1000 pound-force, minimum.
 - b. Dimensions: 1-1/2 inch outside diameter, minimum 0.125 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
- I. Purse Shelf: Fold-down, with spring-loaded hinge designed to automatically return shelf to vertical position when not in use; 0.03 inch satin-finished stainless steel, with 1/4 inch rolled or 1/2 inch channel edge at shelf front.
- J. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

- A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
- B. Shower Curtain:
 - 1. As indicated on the drawings.
- C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
- D. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

2.06 DIAPER CHANGING STATIONS

- A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
 - 1. Material: Polyethylene.
 - 2. Mounting: Surface.

2.07 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
 - 1. Drying rod: Stainless steel, 1/4 inch diameter.
 - 2. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.
 - 3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
 - 4. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.
- D. Reference details on drawings for blocking, reinforcing plates and concealed anchors in walls or ceilings.

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3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Grab Bars: As indicated on drawings.
 - 2. Other Accessories: As indicated on drawings.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

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SECTION 10 31 00 - MANUFACTURED FIREPLACES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 SUMMARY

- A. Manufactured Gas Fireplaces.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.50 - Vented Decorative Gas Appliances; 2019 (Reaffirmed 2024).
- B. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2027.
- C. NFPA 54 - National Fuel Gas Code; 2024.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 441 - Standard for Gas Vents; Current Edition, Including All Revisions.
- F. Review the Following:
 - 1. Materials.
 - 2. Operation.
 - 3. Media.
 - 4. Installation.
 - 5. Field quality control.

1.04 SUBMITTALS

- A. Submittals: Comply with Section 13300 Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, installation clearances, materials, components, equipment, ventilation system, gas lines, electrical wiring diagrams, hardware, finish, options, and accessories.
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Operation and Maintenance Data:

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1. Submit manufacturer's operation and maintenance manual, including the following:
 - a. Operation, maintenance, adjustment, and cleaning instructions.
 - b. Safety information.
 - c. Troubleshooting guide.
 - d. Parts list.
 - e. Electrical wiring diagrams.
2. Provide detailed information required for Owner to properly operate and maintain custom gas fireplaces.

F. Warranty Documentation: Submit manufacturer's standard warranty.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
 1. Store and handle materials in accordance with manufacturer's instructions.
 2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
 3. Store materials in clean, dry area indoors.
 4. Do not store materials directly on floor.
 5. Store materials out of direct sunlight.
 6. Keep materials from freezing.
 7. Protect materials and finish during storage, handling, and installation to prevent damage.

1.06 WARRANTY

- A. Warranty Period:
 1. Firebox: Lifetime.
 2. Main Burner: 5 years.
 3. Control Board: 2 years.
 4. Pilot Burner, Gas Control Valve, Media, Other Gas Components: 1 year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: Acucraft Fireplace Systems, 19672 172nd Street, Big Lake, Minnesota 55309. Ben Krump 763-247-6312 ben@acucraft.com
- B. Substitutions: Not permitted.
- C. Single Source: Provide custom manufactured gas fireplace materials from single manufacturer.

2.02 SOURCE QUALITY CONTROL

- A. Third-Party Certification Tests:
 - 1. ANSI Z21.50.
 - 2. Provide label and ANSI listing for each approved custom manufactured gas fireplace.

2.03 MANUFACTURED GAS FIREPLACES

- A. Description: Vented, decorative, gas appliance fireplace.
- B. Gas Type: LP Propane
- C. Conformance:
 - 1. ANSI Z21.50
 - 2. NFPA 54 (ANSI Z223.1).
 - 3. NFPA 211.
- D. Fireplace Style:
 - 1. Blaze 7'x20" See-Through Fireplace
 - 2. Model: A-7-ST-20
- E. Dimensions:
 - 1. Viewing Area: 84" w x 20" h x 24" d.
 - 2. Overall Unit Dimensions: 93" w x 56" h x 24" d
- F. Glass:
 - 1. Dual Pane
- G. Interior:
 - 1. Black Matte Finish
 - 2. Linear Burner

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2.04 OPERATION

- A. Venting:
 - 1. Exhaust - top of the unit.
 - 2. Intake – base of the unit
- B. Flue:
 - 1. 12" ID Class-B UL 441
- C. Intake:
 - 1. 12" Single-Wall
- D. Electrical: 120 V, 15 A.
- E. Draft Control Board: TPS Controller
- F. Exhaust Fan:
 - 1. RS14 Power Fan
- G. Exhaust Damper:

2.05 MEDIA

SPECIFIER NOTES: SPECIFY TYPE OF MEDIA. DELETE MEDIA TYPES NOT REQUIRED.

- A. Media:
 - 1. Material: 1/4-inch crushed glass.

SPECIFIER NOTES: SPECIFY THE MEDIA COLOR. BLACK REFLECTIVE IS STANDARD.

- a. A. Color: Azuria.
- 2. Material Option: Polished Stone
 - a. A. Color: Black Slate
 - 1) B. Finish: Semi-Polished or Glossy
- 3. Material Option: Driftwood Logs

PART 3 EXECUTION

5.01 PREPARATION

- A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

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5.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions, ANSI Z21.50 and the requirements of authorities having jurisdiction. Use manufacturer's guidelines for minimum clearances to combustibles, walls, and finishes.

5.03 FIELD QUALITY CONTROL

- A. Upon completion of installation, visually inspect all exposed surfaces. Touch up scratches and abrasions with touch-up paint recommended by the manufacturer, make imperfections invisible to the unaided eye from a distance of 5 feet (1.5m).
- B. Test for proper operation, control and safety devices.

5.04 PROTECTION

- A. Protect installed products until completion of project.

5.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain custom manufactured fireplaces.

END OF SECTION

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2149-02 / Blue Ridge Regional Airport Terminal - Bid Documents	10 31 00 - 6	Manufactured Fireplaces

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- B. FM (AG) - FM Approval Guide; current edition.
- C. NFPA 10 - Standard for Portable Fire Extinguishers; 2017, with Errata (2018).
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 30 00 - 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. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.04 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 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.

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1. Class: 2- A:B:C type.
2. Size: 5 pound.
3. Finish: Baked polyester powder coat, red color.
4. Temperature range: Minus 40 degrees F to 120 degrees F.

2.02 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 stainless steel sheet; 0.036 inch thick base metal.
- C. Fire Rated Cabinet Construction: One-hour fire rated.
- D. Cabinet Configuration: Semi-recessed type.
 1. Size to accommodate accessories.
 2. Trimless type.
- E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.
- F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: No. 4.
- J. Finish of Cabinet Interior: White colored enamel.

2.03 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.

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.

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- B. Install cabinets per manufacturer's accessible compliant mounting elevation.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

END OF SECTION

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SECTION 10 81 13 - BIRD CONTROL DEVICES

SECTION INCLUDES:

BIRD CONTROL DEVICES

2.01 ACTION SUBMITTALS:

2.02 PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

2.03 LAYOUT, INCLUDING PLANS AND DETAILS OF BIRD CONTROL DEVICES.

WARRANTY:

3.01 BIRD SPIKES: 20-YEAR WARRANTY

PART 2 - PRODUCTS

4.01 BASIS-OF-DESIGN BIRD SPIKES: PREMIUM MODEL S, FULL ROW, PREMIUM MODEL H, HALF ROW BIRD CONTROL SPIKES AS MANUFACTURED BY NIXALITE OF AMERICA, INC.

MATERIAL: STAINLESS STEEL

CONFIGURATION

6.01 FULL ROW MODEL:

- A. 4 inches wide by 4 inches high
- B. 120 points per foot
- C. Gap free 180-degree coverage

6.02 HALF ROW MODEL:

- A. 2 inches wide by 4 inches high
- B. 60 points per foot
- C. Gap free 90-degree coverage

LENGTHS: 2 FOOT AND 4 FOOT AS REQUIRED TO ACHIEVE REQUIRED LENGTHS AS INDICATED ON THE DRAWINGS.

SCHEDULE: PROVIDE FULL ROW AND HALF ROW BIRD SPIKES AS REQUIRED FOR COMPLETE INSTALLATION.

ACCESSORIES: INCLUDE MANUFACTURER'S STAINLESS STEEL MOUNTING CLIPS, WIRE TIES, ADHESIVE AND OTHER MOUNTING HARDWARE IN CONFIGURATIONS REQUIRED FOR MOUNTING TO SURFACES INDICATED.

PART 3 - EXECUTION

10.01 EXAMINATION: EXAMINE THE INSTALLATION AREA WITH INSTALLER PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES, SURFACE CONDITIONS OF FRAMING, AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.

BIRD SPIKES: DETERMINE REQUIRED NUMBER OF ROWS OF BIRD SPIKES, CONFIGURATION, AND ROW SPACING BASED ON MANUFACTURER'S WRITTEN RECOMMENDATIONS.

ATTACHMENT: AS RECOMMENDED BY THE MANUFACTURER.

END OF SECTION

SECTION 11 33 00 - RETRACTABLE ATTIC ACCESS STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manual disappearing stairways.

1.02 REFERENCES

- A. ANSI A14.9: Safety Requirements for Ceiling Mounted Disappearing Climbing Systems.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings for Stairs:
 - 1. Plan and section of stair installation.
 - 2. Indicate rough opening dimensions for ceiling and/or roof openings.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store stairway until installation inside under cover in manufacturer's unopened packaging. If stored outside, under a tarp or suitable cover.

1.05 WARRANTY

- A. Limited Warranty: One year against defective material and workmanship, covering parts only. Defective parts, as deemed by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Precision Ladders, LLC, P. O. Box 2279; Morristown, TN 37816-2279; Tel: 423-586-2265; Fax: 423-586-2091; www.PrecisionLadders.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 MANUAL DISAPPEARING STAIRWAY.

- A. Manual Disappearing Stairway.

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1. Basis of Design Model: Super Simplex Disappearing Stairway as manufactured by Precision Ladders LLC. Stairs for ceiling heights 7'-0" – 12'-0": Model 1000 (ceiling height in inches). Stairs for ceiling heights 12'-1" – 13'-6": Model 2000 (ceiling height in inches).
- B. Performance Standard: Unit shall comply with ANSI A14.9, Commercial Type, for rough openings between 27 inches to 39 inches. Residential Type for rough openings between 22-1/2" and 27". Stairway capacity shall be rated at 500 lbs.
- C. Accessories:
 1. Steel pole to aid opening and closing stairways.
 2. Stairs for ceiling heights 9' -10" – 12' -0" shall be equipped with a patented Precision Fold Assist to aid in folding and unfolding of sections. Stairs for ceiling heights 12' 1" – 13'6" shall be equipped with 2 Fold Assists. Precision Fold-Assist is optional on stairways for ceiling heights of 9' 9" and below.
 3. Keyed lock for door (standard on fire-rated models, optional on non-fire-rated models).
- D. Components:
 1. Ceiling Opening
 - a. Dropped Ceiling height as indicated on the drawings.
 - b. Access stair to be sized as indicated on the drawings.
 2. Stairway Stringer: 6005-T5 Extruded aluminum channel 5" x 1" x 1/8"; tri-fold design; steel blade type hinges; adjustable feet with plastic Mar-guard. Pitch shall be 63°.
 3. Stairway Tread: 6005-T5 extruded aluminum channel 5 3/16 inches by 1 1/4 inches by 1/8 inch. Depth is 5 3/16 inches. Deeply serrated top surface. Riser Height: 9-1/2 inches. Clear Tread Width for Standard Width: 18 inches.
 4. Railing: Aluminum bar handrail riveted to stringers, upper section only.
 5. Frame:
 - a. When ceiling to floor (or roof deck) above is 12" or greater, the frame shall be 1/8" steel, 63° (with built-in steps) on the hinge end, 90° on the other end, custom depth to fill distance from ceiling to floor above. This custom frame will require a longer opening in the floor above than is required at the ceiling level.
 6. Door Panel
 - a. Standard (non-fire rated) door shall be constructed of 1/8 inch (3 mm) aluminum sheet attached to stairway frame with a steel piano hinge. Door overlaps bottom flange of frame. Eye bolt accommodates pole for opening and closing door.
 - b. Provide lock to secure door panel.
 7. Hardware:

- a. Steel blade type hinge connecting stringer sections. Zinc plated and chromate sealed.
 - 1) Steel operating arms, both sides. Zinc coat with clear trivalent chromate.
 - 2) Double acting steel springs and cable, both sides.
 - 3) Rivets rated at 1100 lb (499 kg) shear strength each.
 - 4) Steel section alignment clips at stringer section joints.
 - 5) Molded rubber guards at corners of aluminum door panel.
 - 6) Door Panel Lock
- 8. Finishes: Mill finish on aluminum stairway components. Prime coat on frame.

2.03 FABRICATION

- A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until rough opening and structural support have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.03 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 24 00 - WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Window shades and accessories.
- B. Electric motor operators.
- C. Motor controls.

1.02 RELATED REQUIREMENTS

- A. Section : Finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
 - 2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.
- B. Preinstallation Meeting: Convene prior to commencing work related to products of this section; require attendance of all affected installers.
- C. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section , for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
 - 1. Motorized Shades: Include power requirements and standard wiring diagrams.
- C. Shop Drawings: Include .
- D. Shop Drawings: Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.
- E. Certificates: Manufacturer's documentation that line voltage components are UL listed or UL recognized.

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- F. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.
- G. Selection Samples: Include .
 - 1. Motorized Shades: Include finish selections for controls.
- H. Verification Samples: Minimum size square, representing actual materials, color and pattern.
- I. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- J. Project Record Documents: Record actual locations of control systems and show interconnecting wiring.
- K. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
- L. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- M. Maintenance contracts.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than years of experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum years of experience.
 - 1. Factory training and demonstrated experience.

1.07 MOCK-UP

- A. Mock-Up: Provide mock-up of window shade complete with selected shade fabric including sample of seam when applicable.
 - 1. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
 - 2. Full-sized mock-up may become part of the final installation.
 - 3. Full-sized mock-up will become the property of the Owner to be used for spare parts.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.09 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

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1.10 WARRANTY

- A. See Section , for additional warranty requirements.
- B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 - 1. Shade Hardware:
 - 2. Electric Motors:
 - 3. Electronic Control Equipment:
 - 4. Fabric:
 - 5. Aluminum and Steel Coatings: .

PART 2 PRODUCTS

2.01 WINDOW SHADE APPLICATIONS

- A. Interior Roller Shades: Sheer shades as indicated on the drawings.
 - 1. Type: Roll down, closed position is at window sill.
 - 2. Fabric Performance Requirements:
 - 3. Mounting:
 - 4. Operation: Manual and motorized, in locations indicated.

2.02 ROLLER SHADES

- A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories.
- B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
- C. Roller Tubes: As required for type of operation.
- D. Hembars: Designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.
- E. Manual Operation for Interior Shades: ; .

2.03 MOTOR CONTROLS

- A. Motorized shades to be controlled by as specified below.
- B. Control Requirements:
 - 1. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system

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programming, etc. as necessary for a complete operating system that provides the control intent indicated.

2. Capable of controlling shade speed for tracking within plus or minus throughout entire travel.
 3. Capable of stopping within accuracy of at any point between open and close limits.
 4. Capable of assigning shades to groups and subgroups without rewiring.
 5. Capable of storing programmable stop points, including open, close, and any other position.
 - a. Program to uniformly align all blinds in unison at closed, 25% open, 50% open, 75% open and 100% open.
 6. Provide power failure memory for preset stops, open and close limits, shade grouping and subgrouping and system configuration.
 7. Capable of synchronizing multiple units of the same size to start, stop and move in unison.
 8. Provide all components and connections necessary to interface with other systems as indicated.
- C. Wall-Mounted Controls: UV stabilized visible parts meeting ASTM D4674; provided by shade manufacturer.
1. Control Functions:

2.04 ACCESSORIES

- A. Fascias: Size as required to conceal shade mounting.
1. Style: As selected by Architect from shade manufacturer's full selection.
 2. Material and Color: To match shade.
- B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.
- C. Lifting Cables: Nylon coated cable for lifting bottom-up type shades.
- D. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.05 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Fabricate shades to fit openings within specified tolerances.
1. Vertical Dimensions: Fill openings from head to sill with space between bottom bar and .
 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.

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3. Horizontal Dimensions - Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed total.
 4. Horizontal Dimensions - Outside Mounting: Cover window frames, trim, and casings completely.
 5. Horizontal Dimensions - Outside Mounting: Extend shades beyond jambs on each side.
- C. Dimensional Tolerances: As recommended in writing by manufacturer.
 - D. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Installation Tolerances:
 1. Inside Mounting: Maximum space between shade and jamb when closed of .
 2. Maximum Offset From Level:
- C. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
- D. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 SYSTEM STARTUP

- A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.05 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.06 CLOSEOUT ACTIVITIES

- A. See Section , for additional requirements.
- B. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.
- C. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of training by manufacturer's authorized personnel at location designated by the Owner.

3.07 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 36 00 - COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters and vanity tops.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.
- B. AWI (QCP) - Quality Certification Program; Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- G. PS 1 - Structural Plywood; 2009.
- H. SEFA 2 - Installations; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.

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- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- B. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 MOCK-UPS

- A. As specified in Div. 06 Architectural Casework

1.08 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Laminate Sheet: NEMA LD 3, Grade HGS, ____ inch nominal thickness.
 - a. Manufacturers: As scheduled on the drawings.
 - 1) Substitutions: See Section 01 60 00 - Product Requirements.
 - b. Finish: As scheduled on the drawings.
 - c. Surface Color and Pattern: As indicated on drawings.
 - 2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick minimum; covered with matching laminate.
 - 3. Back and End Splashes: Same material, same construction.

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4. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.
- C. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
1. Flat Sheet Thickness: 1/2 inch, minimum.
 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers: As scheduled on the drawings.
 - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - c. Color and Pattern: As indicated on drawings.
 3. Other Components Thickness: 1/2 inch, minimum.
 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 5. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.02 MATERIALS

- A. Wood-Based Components:
1. Wood fabricated from old growth timber is not permitted.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, white.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - a. At solid surface tops, rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.

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3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
 4. At sink openings, all cut edges of plywood or substrate shall be sealed.
 5. All wall mounted ledgers shall be painted to match the wall & beveled at the leading edge to minimize viewability.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Wall-Mounted Counters: Provide skirts, braces, and other similar items as indicated on drawings, finished to match.

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.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

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 laboratory worksurface countertops in compliance with requirements of SEFA 2.
- B. Install vanities in accordance with manufacturer's instructions and approved shop drawings
- C. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- D. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

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- E. Attach wood countertops using screws with minimum penetration into substrate board of 5/8 inch.
- F. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 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 22 04 00 - PLUMBING GENERAL REQUIREMENTS

PART 1 –GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Every item of labor, materials, equipment and appurtenances for installing Plumbing Systems included in Division 22 of the Specifications.

1.02 DRAWINGS

- A. The Plumbing Drawings are diagrammatic in nature and show the general arrangement of all piping, equipment and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the Plumbing Drawings, it is not feasible to indicate all offsets, fittings and accessories that may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.
- B. Where discrepancies in scope of work as to which Trade provides specific items, such as starters, disconnects, flow switches, electrical control components, etc. exist, such conflicts shall be reported to the Engineer. If such action is not taken, the Contractor, as applicable, shall furnish such items as part of his work, for complete and operable systems and equipment, as determined by the Engineer.

1.03 SCOPE OF WORK

- A. Installation: Every item of labor, material, devices and appurtenances for installing complete plumbing, drainage and related systems as specified herein and shown on the drawings.
- B. Completion: Upon completion of the work, fixtures, materials, systems and equipment shall be thoroughly cleaned, adjusted and satisfactorily operated.
- C. Limits of Contract: Water service and sanitary sewer piping shall be extended under this section of the specifications to points 5'-0" beyond the building lines, unless otherwise indicated on the drawings, where the pipes shall be capped or plugged and left ready for connection and extension by others, and the locations marked with a stake or other approved means.

1.04 REGULATIONS AND STANDARDS

- A. The completed installation and all materials and equipment shall conform to all applicable portions of National Fire Protection Association Codes, Uniform Statewide Building Code, Virginia Plumbing Code, local ordinances, other regulations and standards listed herein, and all other governing codes and regulations. These are intended as a minimum and shall be exceeded if required by the specifications, the drawings, or governing codes and regulations. In the event of conflict between the codes, standards, or regulations, and information contained in the contract documents, the applicable code, standard, or regulation shall take precedence and no extra compensation will be allowed.

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- B. Refer to Division 1 and Supplementary Instructions to Bidders for construction permitting requirements.

1.05 SUBSTANTIAL COMPLETION INSPECTION

- A. The Engineer will visit the site for the purpose of conducting a substantial completion inspection once the following items have been met by the Contractor:
 - 1. All plumbing systems shall be complete, operational and under automatic control.
 - 2. The Contractor shall attest by letter that all equipment has been wired and tested to verify that the indicated sequence of motor control is established, that all safety controls function properly, that all motor protective devices are sized correctly, and that the systems are operating at the proper set points.
- B. All discrepancies noted in the substantial completion report shall be corrected prior to the final inspection. The Contractor shall provide a detailed item-by-item description of all corrections made for each item on the substantial completion discrepancy list prior to scheduling final inspection by the Engineer. Additional visits required after the final inspection, for the reason that previously documented discrepancies had not been corrected at the time of the final inspection, will be made at the Contractor's expense.

1.06 ASBESTOS

- A. Asbestos Free Materials: The intention of these Drawings and specifications is that there are no asbestos-containing materials installed on this project. To the best of the Architects and Engineers knowledge, none of the material or equipment specified herein or shown on the Drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos-containing materials were used for or in the construction of this project.

1.07 MATERIALS AND WORKMANSHIP

- A. Equipment and material used in the project shall be new and undamaged. The plumbing installation shall fit into the space allotted and shall allow adequate and acceptable clearances for entry, servicing and maintenance. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise. Work shall be performed by mechanics or tradesmen skilled in the trade involved.
- B. All piping shall be installed in a neat and organized manner, parallel to other work and the nearest building elements, unless specifically shown otherwise on the Drawings. Equipment and materials shall be suitable for use in the environment in which they are installed.
- C. Equipment exposed to outside conditions shall be adequately protected from the weather, manufactured from materials suitable for outdoor use, and designed specifically for use in outdoor environments.

1.08 SUBMITTALS

- A. Submit shop drawings, product data and samples in accordance with Division 1 for all items as specified in related sections of these specifications. Electronic submittals shall be required and

shall be returned to the contractor electronically as well. Refer to Division 1 specifications to determine exact submittal submission requirement procedures. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements. Contractor's stamp shall identify the specification section, paragraph and page number for which the submittal is being made. Shop drawings will be reviewed only for general compliance with the Contract Documents. Review will not include correctness of details, proper configuration, utility connections, dimensions, sizes, quantities, and the like. Any submission which has not been reviewed and stamped by the Plumbing Subcontractor will not be reviewed by the Engineer. No reviews prior to award of Contract will be considered or accepted. Re-submissions of shop drawings, product data and samples shall include the entire original submittal. Partial submittals will not be reviewed by the Engineer.

B. Submissions will be stamped by the Engineer in one of the following ways:

"N "No Exceptions Taken"	No exceptions are taken and subject to compliance\ with the Contract Documents.
"Make Corrections Noted"	Minor corrections are noted and a re-submittal is not required subject to compliance with the corrections and the Contract Documents.
"Correct and Resubmit "	The submitted material, method or system meets the intent of the specifications, yet has insufficient data to determine compliance with the Contract Documents. Re-submittal is required.
"Rejected"	The submitted material, method or system does not meet the intent of the specifications, or has insufficient data to determine compliance with the Contract Documents.

C. Submission Procedures:

1. If a submission is satisfactory to the Engineer, the Engineer will annotate the submission, "No Exceptions Taken" or "Make Corrections Noted" and transmit to the Contractor. If a resubmission is required, the Engineer will annotate the submission "Correct and Resubmit" or "Rejected" and transmit to the Contractor for appropriate action.
2. The Contractor shall revise and resubmit submissions as required by the Engineer until submissions are acceptable to the Engineer.

3. Approval of a working and/or shop drawings by the Engineer will constitute acceptance of the subject matter for which the drawing was submitted and not for any other structure, material, equipment or appurtenances indicated as shown.
 4. The Engineer's review of the Contractor's submissions shall in no way relieve the Contractor of any of his responsibilities under the Contract. An approval of a submission shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Documents.
 5. Where as-built drawings, record drawings and specifications are available and when provided to the Contractor for use in performing the work, the Contractor shall verify the content of such drawings and specifications, the suitability of their use in performing the work and their accuracy for the purposes in which the Contractor intends to use any record or historical documents which may be obtained. In no case shall the Contractor assume that such documents reflect a true and accurate record of the construction. Acceptance of any such materials, records, and/or drawings shall in no way result in additional cost to the Owner should an error and/or omission in these documents result in additional costs to the Contractor.
- D. Equivalents: Manufacturers, trade names, and model numbers indicated herein and on Drawings shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Unless definitely stated otherwise and upon complying with Division 1, the Contractor may use any article which, in their judgment is equal to that specified and is accepted by the Engineer. Where three (3) or more manufacturers are named in the specifications for any item, the Contractor shall use one of the named manufacturers. No others will be reviewed or accepted. Manufacturers listed first in these specifications and on Drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes, capacities, etc. of all other manufacturer's items, both named and proposed. If the equipment necessitates changes in piping, wiring, or other building systems from that indicated on the Drawings, the Contractor shall be responsible for all additional costs included and notify other trades. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval.
- E. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials where specifically required by specification and all items identified with an S behind the product title. Submittals not required by the Contract Documents will not be reviewed.
- F. Operation and Maintenance manual(s) shall be submitted in accordance with Division 1 and shall include a complete product index in each volume, installation and maintenance data, sequence of controls, parts lists, a copy of all approved shop drawings and the name, address and telephone number of supplier or nearest representative. All plumbing devices, equipment and systems marked O/M in these specifications shall be included and all other such plumbing items that will require servicing before the duration of its useful life has been reached. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.
- G. The Plumbing Contractor shall submit 1/4 inch per foot shop drawing(s) showing all piping and equipment shown by the plans and specifications. The drawing(s) shall be coordinated with

structural drawings and all other trades, especially the fire and sprinkler, mechanical, electrical and architectural plans. A reproducible drawing shall be corrected to "as built" and submitted to the Owner at the termination of the project.

1.09 WARRANTY

- A. The Contractor shall provide a warranty for a period of one year for all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.
- B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.
- C. Refer to Division 1 for additional warranty requirements.
- D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

1.10 VERIFYING MEASUREMENTS AND CONDITIONS

- A. The exactness of grades, elevations, dimensions, or locations given on the Drawings, is not guaranteed by the Engineer. The Contractor shall, therefore, satisfy themselves as to the accuracy of all grades, elevations, dimensions and locations. In all cases of interconnection of his work with existing or other work, they shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, locations, or dimensions shall be promptly rectified by the contractor without cost to Owner.

1.11 COORDINATION OF WORK

- A. General: The Contract Documents indicate the extent and general arrangement of the plumbing systems. The Contractor shall be responsible for the coordination and proper relation of the plumbing work to the building structure and to the work of other trades. No additional compensation nor extension of completion time will be granted for extra work caused by the lack of coordination.
- B. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.
- C. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the Plumbing Drawings are intended only as a guide to indicate relative locations of the plumbing work. Refer to architectural and structural Drawings for building construction details. The Contractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination shall be completed to verify dimensions and characteristics for the installation of each system.

- D. Unless necessitated by equipment access or otherwise indicated in the Contract Documents, all piping concealed above ceilings and in finished or utility spaces shall be routed as high as possible.
- E. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall provide drains as required for his work to affect these offsets, transitions and changes in direction, as applicable.
- F. Cutting and Patching: Refer to Division 1.
- G. Roughing-In: Verify the locations of other buildings machines, door swings, block coursing, alignment of tile end and other similar features before roughing-in for plumbing equipment components.
- H. Damage to Other Work: Each Contractor is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Contractor who installed the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Contractor responsible for the damage.

1.12 EQUIPMENT INSTALLATION

- A. General: Equipment shall be installed in accordance with manufacturer's instructions to conform with the details and application indicated.
- B. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes but is not limited to frames or supports for items such as tanks, plumbing fixtures, pumps, valves, and other similar items requiring supports.
- C. Service Area: All equipment and appurtenances shall be located to permit adequate service clearance in accordance with manufacturer's recommendations and as otherwise required. Service clearance shall include but not be limited to service and removal of filters, motors, controls, and removal of equipment sections. All piping, and other equipment shall be located outside of the service area or shall be flanged for easy removal to facilitate equipment service. All equipment shall be located with sufficient distance from building features, structural components, and the equipment of other trades. Service clearance in front of electrical panels shall be minimum as required by National Electric Code (NEC) where applicable.
- D. Temporary Requirements: Openings in equipment shall be kept plugged at all times until connection is made to the system. The ends of all pipes and equipment openings shall be kept plugged or capped properly with approved devices. Approved devices are items such as specially molded plastic caps, pipe plugs, test plugs and sheet metal caps.

1.13 SLEEVES AND INSERTS

- A. General: Sleeves and inserts shall be provided and correctly located in the structure, as require for the work.
- B. Inserts shall be steel and proper size for loads encountered.
- C. Sleeves shall be provided for all pipes passing through walls, partitions or slabs installed during construction of the wall, partition or slab. Sleeves placed horizontally in walls or in any position

in beams shall be standard weight ASTM A53 steel pipe of length equal to thickness of wall or beam. Those placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. All sleeves (and core drilled openings) shall be of sufficient diameter to clear bare or covered pipes by 1/4" all around except sleeves on lines subject to movement by expansion which shall clear the bare pipe or insulation on insulated pipe at least one inch all around. Pipes through exterior walls below grade and above footings shall be installed in sleeves having a minimum size of two larger pipe diameters and sealed watertight with flexible synthetic rubber seals. Sleeve shall have anchor and water stop plate. The entire assembly shall be tightened and adjusted and made watertight. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope.

1.14 ESCUTCHEONS

- A. Where pipes pass through floors, walls or ceilings in finished rooms, they shall be fitted with chromium plated metal escutcheons of suitable pattern to effectively cover the rough opening.

1.15 ACCESS DOORS

- A. Provide for all concealed valves, controls, equipment, or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. The Plumbing Contractor shall provide locations of all access doors such that service may be safely performed from a ladder, lift, or platform without the need for support from the ceiling system. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors shall be prime finish steel except those in toilets rooms, kitchens and other similar areas shall be stainless steel with brushed finish.

1.16 ELECTRICAL WIRING AND EQUIPMENT

- A. Wiring, line voltage (101 volts or higher) power or control wiring shall be furnished and installed under Division 26.
- B. Disconnects shall be provided for each item of equipment under Division 26 unless specified otherwise in other sections.

1.17 RECORD OF UNDERGROUND LINES

- A. On completion of the project, the Contractor shall prepare and submit to the Engineer an as-built markup up foundation plan to show the location of any underground lines installed in locations different from those on the Architect-Engineer's Drawings. The location of cleanouts, and the distance from the building to outside sewers, mains, and manholes shall be dimensioned.

1.18 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Contractors shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the plumbing systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the plumbing systems.

1.19 CONSTRUCTION STATUS REPORT

- A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

1.20 GRAPHICS DATABASE

- A. This project's Computer Aided Design & Drafting (CADD) drawing files may be obtained directly from the Engineer for use in preparing computer graphics specific to this project.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2026.
- C. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022, with Errata (2023).
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- E. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2025.
- F. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017 (Reapproved 2025).
- G. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
- H. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- I. NSF 61 - Drinking Water System Components - Health Effects; 2019.

1.02 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Bronze ball valves.
 - 2. Bronze swing check valves.
- C. Related Sections:
 - 1. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 2. Section 22 11 16 – Domestic Water Piping

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Division 1 and Section 22 04 00.
- B. Submit shop drawings and catalog data for each type of valve proposed for this project. Indicate service and installation methods.

1.04 QUALITY ASSURANCE

- A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

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- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handlever: For quarter-turn valves.
- E. Valves in Insulated Piping: With stem extensions and the following features:
 - 1. Bronze gate valves: with rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Solder Joint: With sockets according to ASME B16.18.
 - 3. Threaded: With threads according to ASME B1.20.1.

2.02 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Valve, Inc.
 - b. Conbraco Industries, Inc.; Apollo Valves.
 - c. Crane Co.; Crane Valve Group; Crane Valves.
 - d. Hammond Valve.
 - e. Lance Valves; a division of Advanced Thermal Systems, Inc.
 - f. Legend Valve.
 - g. Milwaukee Valve Company.

- h. NIBCO INC.
- i. Red-White Valve Corporation.
- j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 1) Description:
- k. Standard: MSS SP-110.
- l. CWP Rating: 200 psig.
- m. Body Design: Two piece.
- n. Body Material: Bronze.
- o. Ends: Threaded.
- p. Seats: PTFE or TFE.
- q. Stem: Bronze.
- r. Ball: Chrome-plated brass.
- s. Port: Full.

B. Two-Piece, Regular-Port, Bronze Ball Valves with Bronze Trim:

- 1) Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. American Valve, Inc.
 - c. Conbraco Industries, Inc.; Apollo Valves.
 - d. Crane Co.; Crane Valve Group; Jenkins Valves.
 - e. Crane Co.; Crane Valve Group; Stockham Division.
 - f. DynaQuip Controls.
 - g. Hammond Valve.
 - h. Lance Valves; a division of Advanced Thermal Systems, Inc.
 - i. Milwaukee Valve Company.
 - j. NIBCO INC.
 - 1) Description:
 - k. Standard: MSS SP-110.
 - l. CWP Rating: 200 psig.

- m. Body Design: Two piece.
- n. Body Material: Bronze.
- o. Ends: Threaded.
- p. Seats: PTFE or TFE.
- q. Stem: Bronze.
- r. Ball: Chrome-plated brass.
- s. Port: Regular.

2.03 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

- 1) Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. American Valve, Inc.
 - c. Crane Co.; Crane Valve Group; Crane Valves.
 - d. Crane Co.; Crane Valve Group; Jenkins Valves.
 - e. Crane Co.; Crane Valve Group; Stockham Division.
 - f. Hammond Valve.
 - g. Kitz Corporation.
 - h. Milwaukee Valve Company.
 - i. NIBCO INC.
 - j. Powell Valves.
 - k. Red-White Valve Corporation.
 - l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - m. Zy-Tech Global Industries, Inc.
- 1) Description:
 - n. Standard: MSS SP-80, Type 3.
 - o. CWP Rating: 200 psig.
 - p. Body Design: Horizontal flow.
 - q. Body Material: ASTM B62, bronze.

- r. Ends: Threaded.
- s. Disc: Bronze.

PART 3 EXECUTION

3.01 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

3.02 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.03 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1) Shutoff Service: Ball valves.
 - 2) Throttling Service: Ball valves.
 - 3) Check Valves:
 - b. Bronze swing check valves with bronze disc.
- B. If valves with specified CWP ratings are not available, the same types of valves with higher CWP ratings may be substituted.
- C. Select valves with the following end connections:
 - 1) For Copper Tubing NPS 2 and smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

3.04 DOMESTIC, HOT AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1) Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2) Bronze Angle Valves: Class 125, bronze disc.
 - 3) Ball Valves: Two piece, full port, bronze with bronze trim.
 - 4) Bronze Swing Check Valves: Class 125, bronze disc.

END OF SECTION

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SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ASME B31.9 - Building Services Piping; 2025.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).
- D. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2017, with Editorial Revision (2018).
- E. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2022.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- G. MFMA-4 - Metal Framing Standards Publication; 2004.
- H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- I. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals; 2024, with Errata (2025).

2.02 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Pipe positioning systems.
 - 5. Equipment supports.

2.03 SUBMITTALS

- A. Submit shop drawings in accordance with Division 1 and Section 22 04 00.
- B. Submit shop drawings and catalog data for each type of hanger and support proposed for this project. Include product data, fabrication details and installation methods.

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PART 2 PRODUCTS

3.01 METAL PIPE HANGERS AND SUPPORTS S

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
- B. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 1. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- C. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

3.02 TRAPEZE PIPE HANGERS S

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

3.03 METAL FRAMING SYSTEMS

- A. MFMA Manufacturer Metal Framing Systems:
 - 1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - 2. Standard: MFMA-4.
 - 3. Channels: Continuous slotted steel channel with inturned lips.
 - 4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
 - 6. Metallic Coating: Electroplated zinc, Hot-dipped galvanized, Mill galvanized, In-line, hot galvanized, or Mechanically-deposited zinc.
- B. Non-MFMA Manufacturer Metal Framing Systems:
 - 1. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.

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2. Standard: Comply with MFMA-4.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
6. Coating: Zinc.

3.04 THERMAL-HANGER SHIELD INSERTS S

- A. Insulation-Insert Material for Cold Piping: ASTM C552, Type II cellular glass with 100-psig or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C533, Type I calcium silicate with 100-psig ASTM C552, Type II cellular glass with 100-psig or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

3.05 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.06 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

3.07 PIPE STANDS

- A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
- C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

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D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

3.08 EQUIPMENT SUPPORTS S

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

3.09 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Nonstaining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

4.01 HANGER AND SUPPORT INSTALLATION

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- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A36/A36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Pipe Stand Installation:
 - 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb.
- G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- J. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K. Install lateral bracing with pipe hangers and supports to prevent swaying.

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- L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- O. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

4.02 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

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4.03 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

4.04 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to leave no more than 1-1/2 inches excess.

4.05 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

4.06 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

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- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use thermal-hanger shield inserts for insulated piping.
- H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 - 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

- K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- L. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- M. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
- P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

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SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

2.01 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.

2.02 SUBMITTAL

- A. Submit shop drawings in accordance with Division 1 and Section 22 04 00.
- B. Submit shop drawings and product data for each type of equipment and pipe label proposed for this project. Indicate installation methods.

PART 2 PRODUCTS

3.01 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160°F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch
 - 6. Minimum Letter Size: 3/4 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 7. Fasteners: Stainless-steel self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's unique equipment number, matching that used in the drawings and/or specifications.

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3.02 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Material: Precoiled, semirigid plastic formed to fully cover circumference of pipe and to attach to pipe without fasteners or adhesive, with lettering indicating service, and showing flow direction. Lettering shall be sub-surface printed and protected from direct contact by a layer of plastic.
 - 1. Letter Color:
 - a. Domestic Cold: White
 - b. Domestic Hot: White
 - c. LP Gas: Black
 - 2. Background Color:
 - a. Domestic Cold: Green
 - b. Domestic Hot: Green
 - c. LP Gas: Yellow
 - 3. Maximum Temperature: Able to withstand temperatures up to 160°F.
 - 4. Minimum Label Size and letter height:
 - a. 3/4" to 1-1/4" outside diameter of pipe or covering:
 - 1) 5-inch long, 1/2" letters
 - b. 1-1/2" to 2" outside diameter of pipe or covering:
 - 1) 8-inch long, 3/4" letters
 - c. 2-1/2" to 6" outside diameter of pipe or covering:
 - 1) 12-inch long, 1-1/4" letters
 - 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
 - 6. Label Content: Include system service designation to match plans.
- C. All accessible piping, insulated and uninsulated, shall be identified with piping system markers and arrow flow directional marker, mechanically affixed on all piping installed under Division 22. Attach to piping with 2 inch wide tape with integral clear protective coating and directional arrows.

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PART 3 EXECUTION

4.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

4.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of plumbing equipment.
- B. Locate equipment labels where accessible and visible.

4.03 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces and basements as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. Near major equipment items and other points of origination and termination.
 - 5. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

END OF SECTION

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SECTION 22 07 00 - PLUMBING INSULATION

PART 1 GENERAL

1.01 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 C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2024).
- C. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging; 2018 (Reapproved 2026).
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2025.
- E. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2017, with Editorial Revision (2018).
- F. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2022.
- G. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- H. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2021.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.
- K. ASTM F1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor; 2025.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.02 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold and hot water piping.
 - 2. Domestic recirculating hot-water piping.
 - 3. Supplies and drains for handicap-accessible lavatories and sinks.

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1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Division 1 and Section 22 04 00.
- B. Submit shop drawings and catalog data for each type of pipe insulation proposed for this project.
- C. Shop Drawings shall include:
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 3. Detail removable insulation at piping specialties, equipment connections, and access panels.

1.04 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
- B. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 PRODUCTS

2.01 INSULATION MATERIALS S

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule" for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Special-Shaped Insulation: ASTM C552, Type III.
 - 2. Preformed Pipe Insulation without Jacket: Comply with ASTM C552, Type II, Class 1.
 - 3. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C552, Type II, Class 2.
 - 4. Factory fabricate shapes according to ASTM C450 and ASTM C585.
 - 5. Maximum 0.25 btu•in./sq.ft./°F/hr. "K" value at 75°F.
- G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
 - 1. Maximum 0.25 btu•in./sq.ft./°F/hr. "K" value at 75°F.
- H. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 2. Maximum 0.25 btu•in./sq.ft./°F/hr. "K" value at 75°F.

2.02 INSULATING CEMENTS S

- A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

2.03 ADHESIVES S

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200°F.
 - 1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E96/E96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180°F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Water-Vapor Permeance: ASTM F1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180°F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.05 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300°F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250°F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.06 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.

2.07 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
 1. Width: 3 inches.
 2. Thickness: 11.5 mils.
 3. Adhesion: 90 ounces force/inch in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch in width.
 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.08 SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- C. Wire: 0.080-inch nickel-copper alloy, 0.062-inch soft-annealed, stainless steel, or 0.062-inch soft-annealed, galvanized steel.

2.09 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers:
 1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
- B. Protective Shielding Piping Enclosures:

1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 EXECUTION

3.01 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.03 PENETRATIONS

- A. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated):
Install insulation continuously through walls and partitions.
- D. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies.

3.04 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter,

whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement.

Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.05 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.06 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- #### A.
1. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.07 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.08 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.09 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by A/E, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to two locations of straight pipe, two locations of threaded fittings, one location of strainer, and one locations of threaded valves, for each pipe service defined in the "Piping Insulation Schedule, General" Article.
 - a. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.
- C. Materials and thicknesses in schedules below are for single-layer applications. If multilayer applications are needed, insert additional requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Sanitary and vent piping.
 - 4. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Hot and Recirculated Hot Water: Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 1 inch thick (1/2" to 1-1/4" pipe size), 1-1/2 inch thick (1-1/2" and larger pipe size).
 - 2. Cellular Glass: 1 inch thick (1/2" to 1-1/4" pipe size), 1-1/2 inch thick (1-1/2" and larger pipe size).
 - 3. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick (1/2" to 1-1/4" pipe size), 1-1/2 inch thick (1-1/2" and larger pipe size).
- B. Domestic Cold Water: Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 1 inch thick.
 - 2. Cellular Glass: 1 inch thick.
 - 3. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

C. Exposed Sanitary Drains, Runouts for Domestic Cold & Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be one of the following:

1. Flexible Elastomeric: 1/2 inch thick.
2. Cellular Glass: 1/2 inch thick.
3. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

END OF SECTION

SECTION 22 11 16 - DOMESTIC WATER PIPING

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- C. ASME B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges; 2021.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- E. ASME B16.24 - Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500; 2021.
- F. ASME B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series); 2012 (Reaffirmed 2021).
- G. ASME B31.9 - Building Services Piping; 2025.
- H. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- J. ASTM B813 - Standard Specification for Water Flushable Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2024.
- K. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.
- L. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- M. AWWA C651 - Disinfecting Water Mains; 2023.
- N. AWWA C652 - Disinfection of Water-Storage Facilities; 2019.
- O. NSF 14 - Plastics Piping System Components and Related Materials; 2025.
- P. NSF 61 - Drinking Water System Components - Health Effects; 2019.

2.02 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes under-building-slab and aboveground domestic water pipes, tubes, and air conditioning condensate drain piping and fittings.

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2.03 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

2.04 INFORMATIONAL SUBMITTALS

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

PART 2 PRODUCTS

3.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G.

3.02 COPPER TUBE AND FITTINGS S

- A. Hard Copper Tube: ASTM B88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B88, Type K water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint or threaded ends.
- G. Copper Pressure-Seal-Joint Fittings:
 - 1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

3.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
 - 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
 - 2. Full-face or ring type unless otherwise indicated.

- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B32, lead-free alloys.
- D. Flux: ASTM B813, water flushable.
- E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

3.04 TRANSITION FITTINGS S

- A. General Requirements:
 - 1. Same size as pipes to be joined.
 - 2. Pressure rating at least equal to pipes to be joined.
 - 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

3.05 DIELECTRIC FITTINGS S

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
 - 1. Standard: ASSE 1079.
 - 2. Pressure Rating: 125 psig minimum at 180 deg F.
 - 3. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
 - 1. Standard: ASSE 1079.
 - 2. Factory-fabricated, bolted, companion-flange assembly.
 - 3. Pressure Rating: 125 psig minimum at 180 deg F.
 - 4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric-Flange Insulating Kits:
 - 1. Nonconducting materials for field assembly of companion flanges.
 - 2. Pressure Rating: 150 psig.
 - 3. Gasket: Neoprene or phenolic.
 - 4. Bolt Sleeves: Phenolic or polyethylene.

5. Washers: Phenolic with steel backing washers.
- E. Dielectric Nipples:
1. Standard: IAPMO PS 66.
 2. Electroplated steel nipple complying with ASTM F 1545.
 3. Pressure Rating and Temperature: 300 psig at 225 deg.
 4. End Connections: Male threaded or grooved.
 5. Lining: Inert and noncorrosive, propylene.

PART 3 EXECUTION

4.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance.
- D. Install shutoff valve immediately upstream of each dielectric fitting.
- E. Install water-pressure-reducing valves downstream from shutoff valves.
- F. Install domestic water piping level without pitch and plumb.
- G. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- I. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- K. Install piping to permit valve servicing.
- L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- M. Install piping free of sags and bends.

- N. Install fittings for changes in direction and branch connections.
- O. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- P. Install thermometers on inlet and outlet piping from each water heater.
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors.
- R. Install sleeve seals for piping penetrations of concrete walls and slabs.
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors.
- T. Miscellaneous piping terminating at floor drains or in the air shall be resiliently anchored to protect against fatigue or damage incurred as a result of vibration or abuse.

4.02 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.
- E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."
- F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

4.03 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

4.04 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings, nipples or unions.

4.05 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger, support products, and installation in "Hangers and Supports for Plumbing Piping and Equipment."
 1. Vertical Piping: MSS Type 8 or 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
- E. Install supports for vertical copper tubing every 10 feet.
- F. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

4.06 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
 - 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection.

4.07 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in "Identification for Plumbing Piping and Equipment."
- B. Label pressure piping with system operating pressure.

4.08 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
 - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - 2. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
 - f. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

4.09 ADJUSTING

- A. Perform the following adjustments before operation:
- 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 - 5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 - 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

4.10 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

4.11 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Under-building-slab, domestic water, building-service piping, NPS 2 and smaller, shall be the following:
 1. Soft copper tube, ASTM B88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
- E. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
 1. Hard copper tube, ASTM B88, Type L; cast- or wrought-copper, solder-joint fittings; and brazed or soldered joints.

2. Hard copper tube, ASTM B88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.

END OF SECTION

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SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ASME A112.18.1 - Plumbing Supply Fittings; 2024.
- B. ASME B1.20.7 - Hose Coupling Screw Threads (Inch); 1991 (Reaffirmed 2024).
- C. ASSE 1001 - Performance Requirements for Atmospheric Type Vacuum Breakers; 2021.
- D. ASSE 1010 - Performance Requirements for Water Hammer Arresters; 2025.
- E. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.
- F. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.
- G. ASSE 1017 - Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems; 2023.
- H. ASSE 1022 - Performance Requirements for Backflow Preventer for Beverage Dispensing Equipment (for Carbonated and Non-Carbonated); 2023, with Editorial Revision.
- I. ASSE 1024 - Performance Requirements for Dual Check Backflow Preventers; 2023.
- J. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
- K. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- L. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- M. PDI-WH 201 - Water Hammer Arresters; 2017.
- N. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

2.02 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Vacuum breakers.
 - 2. Backflow preventers.
 - 3. Balancing valves.
 - 4. Temperature-actuated, water mixing valves.

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5. Water Submeter.
6. Strainers.
7. Hose bibbs.
8. Drain valves.
9. Domestic Water Booster Pump.
10. Domestic Water Softener.
11. Domestic Water Filter.
12. Water-hammer arresters.

2.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.

2.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

2.05 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 PRODUCTS

3.01 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61 Annex G.

3.02 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

3.03 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
 1. Standard: ASSE 1001.
 2. Size: NPS 1/4 to NPS 3, as required to match connected piping.
 3. Body: Bronze.
 4. Inlet and Outlet Connections: Threaded.
 5. Finish: Chrome plated.
- B. Hose-Connection Vacuum Breakers:

1. Standard: ASSE 1011.
2. Body: Bronze, nonremovable, with manual drain.
3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
4. Finish: Rough bronze.

3.04 BACKFLOW PREVENTERS S

- A. BFP-1: Shall be equal to Watts series LF909M1-QT-S or approved equal. Backflow preventer shall be reduced pressure zone meeting the requirements of ASSE 1013. It shall be Lead Free bronze-bodied. A brass identification tag shall indicate direction of flow and shall be securely attached to the valve body by corrosion resistant mechanical fasteners.
- B. BFP-2: Shall be equal to Watts SD-3 or approved equal. BFP shall be suitable for use with coffee machines and shall be ASSE 1022 certified. Backflow preventer body and adapters shall be 316 stainless steel construction and all rubber components comply with FDA food additive regulations. All materials in contact with the potable water shall be in compliance with the requirements of the Safe Drinking Water Act, Public Law 93-523, National Interim Primary Drinking Water Regulations. Strainer manufactured from NSF approved acetal plastic.
- C. BFP-3: Shall be equal to Febco series LF510 or approved equal. Backflow preventer shall be dual check backflow preventer meeting the requirements of ASSE 1024. It shall be Lead Free bronze-bodied and include not less than one union, with the union nut drilled to accept a tamper-proofing lock wire. A brass identification tag shall indicate direction of flow and shall be securely attached to the valve body by corrosion resistant mechanical fasteners.

3.05 DOMESTIC WATER SUBMETERS S

- A. Where indicated on the plans, schedules and/or domestic water riser diagram, provide domestic water submeter.
- B. Basis of Design:
 1. Neptune T-10 water meter.
 - a. Magnetic-driven, low-torque registration ensures accuracy. Impact-resistant register. High-resolution, low-flow leak detection. Bayonet-style register mount allows in-line serviceability. Tamperproof seal pin deters theft. Date of manufacture, size, and model stamped on dial face
 - b. Made from lead free, high-copper alloy, NSF/ANSI 372, NSF/ANSI 61, Lifetime guarantee, Resists internal pressure stresses and external damage. Handles in-line piping variations and stresses, Lead free, high-copper alloy provides residual value vs. plastic or composite. Electrical grounding continuity.
 - c. NSF/ANSI 372, NSF/ANSI 61.
 - d. 150 psi Maximum operating pressure. Threaded connections.
 - e. Register Types: Direct reading: bronze box and cover.

3.06 BALANCING VALVES S

A. Memory-Stop Balancing Valves:

1. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 2 or smaller.
4. Body: Copper alloy.
5. Port: Standard or full port.
6. Ball: Chrome-plated brass.
7. Seats and Seals: Replaceable.
8. End Connections: Solder joint or threaded.
9. Handle: Vinyl-covered steel with memory-setting device.

3.07 TEMPERATURE-ACTUATED, WATER MIXING VALVES S

A. Primary, Thermostatic, Water Mixing Valves (TMV-1):

1. Basis of design: Watts-Powers LFMMVM1
2. ASSE 1017 certified, ANSI / NSF 61 & 372, lead-free brass body, thermal actuator performance at low flow, adjustable temperature selection (90°F-160°F) with lock down, union connections, integral checks and inlet screens. Tempered water setting 120°F.

B. Primary, Thermostatic, Water Mixing Valves (TMV-2):

1. Basis of design: Sioux Chief 696 Series.
2. ASSE 1070 certified, ANSI / NSF 61 & 372, lead-free brass body, thermal actuator performance at low flow, adjustable temperature selection (80°F-120°F), 1/2" inlet connections, integral quarter-turn in-line isolation valves, integral checks and ss inlet screens, 3/8" compression tempered outlet with optional cold bypass outlet. TMV shall be mounted in recessed ABS access box with finish frame. Tempered water setting 105°F

3.08 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 3 and smaller.
3. End Connections: Threaded for NPS 2 and smaller, Flanged for NPS 3 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.

5. Perforation Size:
 - a. Strainers NPS 3 and Smaller: 0.020 inch.
6. Drain: Factory-installed, hose-end drain valve.

3.09 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Rough bronze.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Wheel handle.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

3.10 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.

6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

3.11 DOMESTIC WATER BOOSTER PUMP S

- A. Basis of Design: HYFAB Break Tank Skid with eMVPjr-1-L-21 Variable Speed Pressure Booster, selected for 20 GPM @40 PSI boost. 208/1/60; Unit Fully Piped and Wired; Mounted on Frame and Factory Tested.
- B. General Description: Factory-assembled and tested variable speed domestic water pressure booster system with pump, piping, isolation and check valves, controls, specialties and accessories mounted on a structural steel base. Pump and electrical protection shall be integrated into the pump controller package.
- C. Pumps:
 1. Pumps shall be multistage centrifugal pump unit/s, Model e-SV as manufactured by Goulds Pumps or equal. All pump units shall be from one manufacturer and provided complete including electric motor drive.
 - a. Casing Construction: The pump casing shall be of deep drawn, laser welded AISI 304L or 316L stainless steel. Pump connection shall be a T-Oval-2 Bolt /304 with 232 psi g MAQP. Wear Ring: Wear rings shall be provided within each stage. Wear rings must be self centering and easily replaceable.
 - b. Impeller: Impellers shall be of enclosed design and constructed of AISI 316L stainless steel. Impellers shall provide internal thrust balance in each stage.
 - c. Diffuser Bowl: Each stage shall have a bowl with attached diffuser and be constructed of AISI 304L stainless steel.
 - d. Seal Housing: The seal housing shall be of concave design and shall hold the seal faces below the topmost part of the pump casing.
 - e. Mechanical Seal: Mechanical seals consisting of high temperature carbon rotating ring, stainless steel spring, silicon carbide graphite filled seat, and viton elastomer.
 - f. Shaft Sleeve and Bearing: The pump shall have shaft sleeves made of Tungsten Carbide and ceramic bearings. Shaft height shall be set with a standard spacer.
 - g. Electric Motor: The pump drive motor shall be NEMA standard design TC frame suitable for vertical mounting and close coupled to the pump unit. Motors shall be of standard manufacturers catalog design and must not use special bearings as a thrust handling device. The motor rating shall be as specified on the pressure booster schedule and shall have a 1.15 service factor.

- h. Testing: Each pump shall be hydrostatically tested by the manufacturer in accordance with Hydraulic Institute Standards at a minimum of 350 PSI. Production performance testing shall also be conducted by the manufacturer on each pump unit. Flow and head shall be measured at three operating to verify performance.
- i. NPSH: Unit shall be provided with low NPSH option for open system applications
- D. Check valves: Silent Seat Check valves shall be installed on the discharge of each pump.
- E. Isolation Valves: Two-piece, forged brass, full port ball valve shall be provided on the suction of each pump and the discharge of each check valve for isolation.
- F. Piping: All piping shall be constructed from Brass and Type L copper tubing. Suction and Discharge piping shall be designed and constructed for minimal friction loss.
- G. Package Base: The pressure booster base shall be designed and fabricated to provide proper structural support for all attached equipment, and provide for anchorage to the structure. The base shall include a rigid structural member for pump and motor support. Main members shall be constructed from heavy weight A-36 structural steel members. Steel base shall be painted with machinery enamel.
- H. Control Panel: Manufacturer shall provide a UL 508A listed complete electrical system including main disconnect, variable speed pump controller, pressure transducer, instrumentation and controls to automatically start, stop and modulate pump speed to smoothly, efficiently and reliably provide pump variable flow rates at a constant discharge pressure. The booster package shall include full pump, motor and drive safety features required to protect the equipment and piping system.
 - 1. Motor Controller: NEMA 1 variable-frequency, variable torque, solid-state pulse-width modulating type. VFD protective features shall include:
 - a. Short Circuit
 - b. Over/Under Voltage
 - c. Motor Overload
 - d. Controller Ground Fault Temperature, Over/Under Temperature
 - e. Dead Heading, Run Out, Suction Loss
 - f. Sensor Fault
 - g. Bound Pump
 - 2. Discharge pressure transducer.
 - a. Pressure transducer shall be utilized for providing all pressure signals for the pump control logic. Pressure switches are not acceptable.
 - b. Pressure transducer shall be a solid-state bonded strain gage type with an accuracy of plus/minus 1 %. Transducer shall be constructed of non-ferrous metal suitable for

used with domestic water. Pressure transducers constructed of plastic are not acceptable.

- c. Pressure transducer shall utilize an M12 type connector to prevent moisture intrusion

3. Hydro-pneumatic Tank

- a. Furnish tank of size pressure rating and construction specified on pressure booster schedule.
- b. Furnish hydro-pneumatic tank connection valve on unit discharge with union on discharge of packaged pressure booster. Furnish drain valve between isolation valve and tank.

4. Sequence of Operation

- a. The pump controller shall receive a 4-20mA signal from the pressure transducer.
- b. The pressure transducer shall monitor system discharge pressure and provide an analog signal to the pump control software, and allow the VFD motor controller to provide a variable Volts/Hz output to the motor.
- c. Whenever the pressure drops below the set system pressure, the pump shall start and run at speed required to maintain system pressure setpoint (as set by the operator.).
- d. When the system experiences low demand the controller shall test for a no flow condition without the use of external switches or controls. The controller will stop the pump after verifying a zero demand condition exists and a minimum run-timer has elapsed. The hydro-pneumatic tank shall supply water to the system until the pressure falls below the restart pressure, at which point the lead pump shall restart.
- e. All program settings shall be based on centrifugal pump language.

3.12 DOMESTIC WATER SOFTENER S

- A. Basis of Design: Marlo model MGA-24G-1-1/2.
- B. Provide as indicated a vertical pressure type water filtration system requiring minor assembly and media loading at installation. The system shall be of an approved design as fabricated by a manufacturer regularly engaged in the production of water treatment equipment. All equipment and material shall be supplied in compliance with the specifications as intended for a complete and operational system. Qualified manufacturers of water treatment equipment shall be engaged in the manufacture of this type of equipment for a period of not less than (10) ten years.
- C. General: The system, in compliance with equipment specifications, is described as an automatic Twin Parallel/Timeclock water filtration system meeting the performance and design data requirements as hereinafter specified. The system specifications are based on Marlo Model MGA-24G-1-1/2 Twin Parallel/Timeclock Continuous Regeneration Filtration System. The purpose of the automatic filter will be to remove manganese from a known water supply to a level not to exceed 0.3 mg/l and 0.05 mg/l respectively.

- D. Tank: Tank(s) shall be manufactured of fiberglass reinforced polyester (FRP). The exterior side shall be reinforced by a continuous roving glass filament overwrap of the same color as the vessel(s) shell. The tanks(s) shall be supported by a molded polypropylene structural base. The tanks(s) shall be designed for a working pressure of 150 psi and a temperature of 120°F. A minimum freeboard volume of 50% shall be provided to assure adequate bed expansion during backwash.
- E. Main Operating Valve(s): The control valve shall have 1.5 inch inlet and outlet connections and be constructed of lead-free brass. It shall be of the mechanically actuated, four position type to accomplish the regeneration steps of backwash and fast rinse. The valve shall contain a self-adjusting backwash flow control. The system shall not allow for the bypass of untreated water to service during the regeneration cycle.
- F. Control System: The control system shall have an integral timer for adjustable duration of the various steps in the regeneration cycle and shall allow for the manual initiation of the regeneration cycle. The system shall have an electronic microprocessor based controller with a 2-4 line scrolling OLED display. The display shall indicate: system number, networking status, valve state, master unit, time of day, day & date, batch volume remaining, and current flow rate. In addition, an LED status light shall be provided to indicate controller status: in service, regeneration queued or regenerating, standby, or error. Programming and time of day to be stored in non-volatile memory. The controller shall also be capable of providing the real time flow rate, peak flow rate, totalizer, reserve capacity, use since last regeneration, last regeneration, total number of regenerations, regeneration interval, last settings change, error log history and average daily use. The controller shall provide two programmable relay outputs one of which can be used for alarm output. The controller shall operate on 24 VDC and multi-unit communications shall be accomplished with low voltage network cables. The controller shall be capable of networking up to eight valves. Mode of Operation: The system shall consist of two media tanks and operate in the parallel flow configuration. All filter tanks are on-line simultaneously. As each media tank's user set regeneration time is reached it shall immediately be taken off-line, regenerated, and placed immediately back on-line. Simultaneous regenerations are not possible.
- G. Filter Media: A greensand plus media filter bed shall be provided for manganese and suspended solids removal. The media has an effective size of 0.3 to 0.35 mm and filter requires a minimum bed depth of 30 inches. Regeneration with potassium permanganate and/or chlorine is needed for efficient manganese removal.
- H. Warranty: The water filtering equipment shall be warranted against failure due to faulty materials, and workmanship for a period of one (1) year after installation or eighteen (18) months after shipment, whichever occurs first. In addition, the fiberglass reinforced pressure vessel(s) shall be warranted for a period of five (5) years.

3.13 DOMESTIC WATER FILTER S

- A. Carbon water filter with scale inhibitor for chlorine, sediment, scale build-up, taste and odor, THMs, VOCs, MTBE, and more. Scale control product prevents scale and stops corrosion. Delivers 20 gallon per minute flow rate. 80,000 gallon filter life.

3.14 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Metal bellows or Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
1. Locate backflow preventers in same room as connected equipment or system.
 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
 3. Do not install bypass piping around backflow preventers.
- B. Provide Factory Authorized Start-Up of pressure booster system (1 day).
- C. Install booster package in specified location. Provide access for periodic maintenance, including removal of motors, impellers, and accessories. Verify proper pump rotation at start-up. Perform start-up procedures per manufacturer's instructions. Adjust pressure and temperature set points
- D. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
- E. Install Y-pattern strainers for water on supply side of each control valve and pump.
- F. Install water-hammer arresters in water piping according to PDI-WH 201.

4.02 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
1. Test each pressure vacuum breaker and double-check backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

4.03 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow set points of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION

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SECTION 22 11 26 - FACILITY LIQUIFIED-PETROLEUM GAS PIPING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- C. ASME B16.39 - Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300; 2025.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- E. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2015b.
- F. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2023).
- G. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications; 2022.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- I. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipes, tubes, and fittings.
 - 2. Piping specialties.
 - 3. Piping and tubing joining materials.
 - 4. Submeters.
 - 5. Valves.
 - 6. Pressure regulators.

1.03 PERFORMANCE REQUIREMENTS

- A. LPG System Pressures: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2 psig and is reduced to secondary pressure of 0.5 psig or less.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Delegated-Design Submittal: For LPG piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 PRODUCTS

2.01 PIPES, TUBES, AND FITTINGS

1. Steel Pipe: ASTM A53/A53M, black steel, Schedules 40 and 80, Type E or S, Grade B.
2. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.
5. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. OmegaFlex, Inc.
 - b. Parker Hannifin Corporation; Parflex Division.
 - c. Titeflex.
 - d. Tru-Flex Metal Hose Corp.
6. Tubing: ASTM A240/A240M, corrugated, Series 300 stainless steel.
7. Coating: PE with flame retardant.
 - a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1) Flame-Spread Index: 25
 - 2) Smoke-Developed Index: 50

8. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
9. Striker Plates: Steel, designed to protect tubing from penetrations.
10. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
11. Operating-Pressure Rating: 5 psig

2.02 PIPING SPECIALTIES S

1. Appliance Flexible Connectors (Indoor appliances only):
2. Corrugated stainless-steel tubing with polymer coating.
3. Operating-Pressure Rating: 0.5 psig.
4. End Fittings: Zinc-coated steel.
5. Threaded Ends: Comply with ASME B1.20.1.
6. Maximum Length: 24 inches
7. Y-Pattern Strainers:
8. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
9. End Connections: Threaded ends for NPS 2 and smaller.
10. Strainer Screen: 40-mesh startup strainer and perforated stainless-steel basket with 50 percent free area.
11. CWP Rating: 125 psig
12. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.03 JOINING MATERIALS

1. Joint Compound and Tape: Suitable for LPG.

2.04 GAS SUBMERS S

1. Where indicated on the plans and/or gas riser diagram on sheet P5.01, provide a 'Local Use Meter' for local metering of the LP Gas usage.
2. Submeter shall be compact for indoor use.
3. Basis of Design:
4. American Meter Company model AC-800

- a. Diaphragm gas meter designed to accurately submeter application of gas appliances.
- b. Die-cast aluminum case.
- c. Suitable for use with LP Gas.
- d. High-performance ball bearing crank frame for excellent sustained accuracy.
- e. Molded, convoluted diaphragms for smooth operation and long life.
- f. 800 SCFH (0.60 specific gravity gas) at 1/2-inch W.C. differential
- g. Meets the performance criteria of ANSI B109.2
- h. Threaded Ends: Comply with ASME B1.20.1.

2.05 MANUAL GAS SHUTOFF VALVES

- 1. Metallic Valves, NPS 2 and Smaller for Liquid Service: Comply with ASME B16.33 and UL 842.
- 2. CWP Rating: 250 psig .
- 3. Threaded Ends: Comply with ASME B1.20.1.
- 4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
- 5. Listing by CSA or agency acceptable to authorities having jurisdiction for valves 1 inch and smaller.
- 6. General Requirements for Metallic Valves, NPS 2 and Smaller for Vapor Service: Comply with ASME B16.33.
- 7. CWP Rating: 125 psig.
- 8. Threaded Ends: Comply with ASME B1.20.1.
- 9. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
- 10. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
- 11. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
- 12. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
- 13. Body: Bronze, complying with ASTM B584.
- 14. Ball: Chrome-plated bronze.
- 15. Stem: Bronze; blowout proof.

16. Seats: Reinforced TFE; blowout proof.
17. Packing: Threaded-body packnut design with adjustable-stem packing.
18. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
19. CWP Rating: 600 psig.
20. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
21. Service: Suitable for LPG service with "WOG" indicated on valve body.
22. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.
23. Body: Bronze, complying with ASTM B584.
24. Ball: Chrome-plated bronze.
25. Stem: Bronze; blowout proof.
26. Seats: Reinforced TFE.
27. Packing: Threaded-body packnut design with adjustable-stem packing.
28. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
29. CWP Rating: 600 psig.
30. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
31. Service: Suitable for LPG service with "WOG" indicated on valve body.

2.06 MOTORIZED GAS VALVES

1. Electrically Operated Valves: Comply with UL 429.
2. Pilot operated.
3. Body: Brass or aluminum.
4. Seats and Disc: Nitrile rubber.
5. Springs and Valve Trim: Stainless steel.
6. 120-V ac, 60 Hz, Class B, continuous-duty molded coil, replaceable.
7. NEMA ICS 6, Type 4, coil enclosure.
8. Normally closed.
9. Visual position indicator.

2.07 PRESSURE REGULATORS

1. General Requirements:
2. Single stage and suitable for LPG.
3. Steel jacket and corrosion-resistant components.
4. Elevation compensator.
5. End Connections: Threaded for regulators NPS 2 and smaller.
6. Line Pressure Regulators (LPR): Comply with ANSI Z21.80.
7. Body and Diaphragm Case: Cast iron or die-cast aluminum.
8. Springs: Zinc-plated steel; interchangeable.
9. Diaphragm Plate: Zinc-plated steel.
10. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
11. Orifice: Aluminum; interchangeable.
12. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
13. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.
14. Pressure regulator shall maintain discharge pressure setting downstream and not exceed 150 percent of design discharge pressure at shutoff.
15. Overpressure Protection Device: Factory mounted on pressure regulator.
16. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
17. Maximum Inlet Pressure: 2 psig.
18. Appliance Pressure Regulators (APR): Comply with ANSI Z21.18.
19. Body and Diaphragm Case: Die-cast aluminum.
20. Springs: Zinc-plated steel; interchangeable.
21. Diaphragm Plate: Zinc-plated steel.
22. Seat Disc: Nitrile rubber.
23. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
24. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.

25. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
26. Maximum Inlet Pressure: 1 psig.

2.08 DIELECTRIC UNIONS

1. Dielectric Unions:
2. Description:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: 125 psig.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 EXECUTION

3.01 OUTDOOR PIPING INSTALLATION

- A. Comply with the Virginia Fuel Gas Code for installation and purging of LPG piping.
- B. Steel Piping with Protective Coating:
 1. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 2. Replace pipe having damaged PE coating with new pipe.
- C. Install fittings for changes in direction and branch connections.
- D. Install pressure gage downstream from each service regulator. Pressure gages are specified in Section 23 05 00 "Common Work Results for HVAC".

3.02 INDOOR PIPING INSTALLATION

- A. Comply with the Virginia Fuel Gas Code for installation and purging of LPG piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install LPG piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Verify final equipment locations for roughing-in.
- L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where readily accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- Q. Connect branch piping from top or side of horizontal piping.
- R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.
- S. Do not use LPG piping as grounding electrode.
- T. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
- U. Install pressure gage downstream from each line regulator. Pressure gages are specified in 23 05 00 "Common Work Results for HVAC."
- V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 23 05 00 "Common Work Results for HVAC."
- W. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.03 VALVE INSTALLATION

1. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, or copper connector.
2. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
3. Install motorized gas shutoff valve for each gas appliance down stream of manual gas valve and ahead of corrugated stainless-steel tubing or copper connector for gas appliances located under kitchen exhaust hood. Wire valve to hood controller.

3.04 PIPING JOINT CONSTRUCTION

1. Ream ends of pipes and tubes and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Threaded Joints:
4. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
5. Cut threads full and clean using sharp dies.
6. Ream threaded pipe ends to remove burrs and restore full ID of pipe.
7. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
8. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.05 HANGER AND SUPPORT INSTALLATION

1. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
2. NPS 1/2 and Smaller: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. NPS 1 and NPS 3/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
4. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

3.06 CONNECTIONS

1. Connect to site provided propane main according to utility's procedures and requirements.
2. Install LPG piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
3. Install piping adjacent to appliances to allow service and maintenance of appliances.

4. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliances and equipment. Install union between valve and appliances or equipment.
5. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.07 LABELING AND IDENTIFYING

1. Comply with requirements in Section 22 05 53 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

3.08 FIELD QUALITY CONTROL

1. Test, inspect, and purge natural gas according to the Virginia Fuel Gas Code and authorities having jurisdiction.
2. LPG piping will be considered defective if it does not pass tests and inspections.
3. Prepare test and inspection reports.

3.09 OUTDOOR PIPING SCHEDULE

1. Aboveground, outdoor LPG piping shall be the following:
2. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.

3.10 INDOOR PIPING SCHEDULE

1. Aboveground, indoor LPG piping shall be the following:
2. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.

3.11 MANUAL GAS SHUTOFF VALVE SCHEDULE

1. Valves for pipe sizes NPS 2 and smaller at service meter shall be one of the following:
2. One-piece, bronze ball valve with bronze trim.
3. Two-piece, full-port, bronze ball valves with bronze trim.
4. Bronze plug valve.

END OF SECTION

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

2.01 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 C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2026.
- C. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.
- D. ASTM C1540 - Standard Specification for Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.
- E. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2025.
- F. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).
- G. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- H. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020 (Reapproved 2024).
- I. ASTM D3311 - Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fittings Patterns; 2022 .
- J. ASTM F402 - Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings; 2026.
- K. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe; 2014 (Reapproved 2021).
- L. ASTM F656 - Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2025.
- M. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
- N. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

2.02 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.

2.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

2.04 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 PRODUCTS

3.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

3.02 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
 - 1. Standards: ASTM C1277 and CISPI 310.
 - 2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.
- C. Heavy-Duty, Hubless-Piping Couplings:
 - 1. Standards: ASTM C1277 and ASTM C1540.
 - 2. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

3.03 PVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D2665, drain, waste, and vent.
- B. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- C. Adhesive Primer: ASTM F656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Solvent Cement: ASTM D2564.
1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

3.04 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:
 - a. Standard: ASTM C 1173.
 - b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - c. Sleeve Materials:
 - 1) For Cast-Iron Soil Pipes: ASTM C564, rubber.
 - 2) For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D 5926, PVC.
 - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
4. Shielded, Nonpressure Transition Couplings:
 - a. Standard: ASTM C 1460.
 - b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 EXECUTION

4.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- J. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping smaller than NPS 3; 1 percent downward in direction of flow for piping NPS 3 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow for piping smaller than NPS 3; 1 percent downward in direction of flow for piping NPS 3 and larger.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- K. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

- L. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- M. Install underground PVC piping according to ASTM D2321.
- N. Plumbing Specialties:
 - 1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping.
 - 2. Install drains in sanitary drainage gravity-flow piping.
- O. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in "Sleeves and Sleeve Seals for Plumbing Piping."
- Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in "Sleeves and Sleeve Seals for Plumbing Piping."
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

4.02 JOINT CONSTRUCTION

- A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- B. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- C. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Piping: Join according to ASTM D2855 and ASTM D2665 Appendixes.

4.03 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Shielded, nonpressure transition couplings.

4.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.

2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
 4. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 6. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4: 60 inches with 5/8-inch rod.
 4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS : 48 inches with 3/8-inch rod.
 2. NPS 3: 48 inches with 1/2-inch rod.
 3. NPS 4: 48 inches with 5/8-inch rod.
- H. Install supports for vertical PVC piping every 48 inches.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

4.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

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- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
 - 5. Comply with requirements for cleanouts and drains specified in "Sanitary Waste Piping Specialties."
 - 6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

4.06 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in 22 05 53 "Identification for Plumbing Piping and Equipment."

4.07 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

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- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.

4.08 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work. Place plugs in ends of uncompleted piping at end of day and when work stops.

4.09 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:
 - 1. Hubless, cast-iron soil pipe and fittings; CISPI or heavy-duty hubless-piping couplings; and coupled joints.
 - 2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- C. Aboveground, vent piping NPS 4 and smaller shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI or heavy-duty hubless-piping couplings; and coupled joints.
 2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:
1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION

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SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ASME A112.14.3 - Hydromechanical Grease Interceptors; 2022, with Errata.
- B. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2026.
- C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- D. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2014.
- E. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2026.

2.02 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Cleanouts.
 - 2. Roof flashing assemblies.
 - 3. Miscellaneous sanitary drainage piping specialties.
 - 4. Flashing materials.
 - 5. Grase Interceptor.

2.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

2.04 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 PRODUCTS

3.01 CLEANOUTS

- A. Exposed Cast-Iron Cleanouts:
 - 1. Standard: ASME A112.36.2M for cast iron for cleanout test tee.

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2. Size: Same as connected drainage piping
3. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure: Countersunk or raised-head, cast-iron plug.
5. Closure Plug Size: Same as cleanout size.

B. Cast-Iron Floor Cleanouts S:

1. Standard: ASME A112.36.2M for threaded, adjustable housing cleanout.
2. Size: Same as connected branch.
3. Type: Threaded, adjustable housing.
4. Body or Ferrule: Cast iron.
5. Outlet Connection: Spigot or Threaded.
6. Closure: Brass plug with straight threads and gasket.
7. Adjustable Housing Material: Cast iron with threads, set-screws or other device.
8. Frame and Cover Material and Finish: Polished bronze.
9. Frame and Cover Shape: Round.
10. Top Loading Classification: Light Duty.
11. Riser: ASTM A74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Standard: ASME A112.36.2M. Include wall access.
2. Size: Same as connected drainage piping.
3. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure: Countersunk or raised-head cast-iron plug.
5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
6. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

3.02 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Description: Manufactured assembly made of 4.0-lb/sq. ft., 0.0625-inch-thick, lead flashing collar and skirt extending at least 6 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.
 - a. Open-Top Vent Cap: Without cap.

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- b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
- c. Extended Vent Cap: With field-installed, vandal-proof vent cap.

3.03 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

- 1. Description: Shop or field fabricate from ASTM A74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C564, rubber gaskets.
- 2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Deep-Seal Traps:

- 1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
- 2. Size: Same as connected waste piping.
 - a. NPS 2: 4-inch-minimum water seal.
 - b. NPS 2-1/2 and Larger: 5-inch-minimum water seal.

C. Air-Gap Fittings:

- 1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
- 2. Body: Bronze or cast iron.
- 3. Inlet: Opening in top of body.
- 4. Outlet: Larger than inlet.
- 5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

D. Sleeve Flashing Device:

- 1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
- 2. Size: As required for close fit to riser or stack piping.

E. Stack Flashing Fittings:

- 1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
- 2. Size: Same as connected stack vent or vent stack.

F. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

G. Air Admittance Valve:

1. Valves shall be Studor, Oatey or Rectorseal, mechanical valve with screen to prevent trap siphonage, ANSI/ASSE 1051 listed, PVC construction. Recessed valves shall be installed in multi-purpose recessed wall box complete with louvered cover.

3.04 FLASHING MATERIALS

- A. Lead Sheet: ASTM B749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
 2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
- B. Fasteners: Metal compatible with material and substrate being fastened.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Solder: ASTM B32, lead-free alloy.
- E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

3.05 GREASE INTERCEPTOR (GI-1) S

- A. Shall be manufactured by Schier, interceptor model GB-50. Interceptor shall be made of seamless, molded polyethylene with minimum 3/8" uniform wall thickness. Interceptor shall be furnished for below-grade installation with adjustable cover adapter, safety access restrictor built into cover adapter, and three outlet options. Unit shall be certified for hydromechanical performance to ASME A112.14.3 (Type D) and CSA B481.1. Interceptor flow maximum rate shall be 50 GPM. Interceptor grease capacity shall be 439 lbs
1. 4" FPT inlet/outlet with 4" plain end fittings.
 2. Grease Capacity (50 GPM): 439 lbs (60 gal).
 3. Vent not required unless per local code.
 4. Integral air relief / Anti-siphon / Sampling access.
 5. Cover adapters provide an adjustable height range of 5".
 6. For outdoor installation, provide traffic-rated (AASHTO H-20) cast iron cover. Cover shall provide water/gas-tight seal and have a minimum of 16,000 lbs load capacity.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- E. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- F. Assemble open drain fittings and install with top of hub 2 inches above floor or as indicated in plans.
- G. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- H. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- I. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- J. Install vent caps on each vent pipe passing through roof.
- K. Install air admittance valves per manufacturer recommendations.
- L. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

4.02 CONNECTIONS

- A. Comply with requirements in "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

4.03 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 07 62 00 "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

4.04 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each grease interceptor.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

4.05 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

4.06 GREASE INTERCEPTOR

- A. Install grease interceptor according to authorities having jurisdiction and with clear space for servicing. Coordinate exact installation location to ensure full access to top of interceptor and coordinated to piping slope.
- B. Install extension as required for flush access with finished grade.

1. Install interceptor in accordance with manufacturers instructions and approved product data submittals.

END OF SECTION

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SECTION 22 33 00 - ELECTRIC, DOMESTIC-WATER HEATERS

SECTION 22 33 00 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2025).
- B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- C. ASME B1.20.7 - Hose Coupling Screw Threads (Inch); 1991 (Reaffirmed 2024).
- D. ASSE 1010 - Performance Requirements for Water Hammer Arresters; 2025.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- G. PDI-WH 201 - Water Hammer Arresters; 2017.

2.02 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Electric, Storage tank, domestic-water heater.
 - 2. Domestic-water recirculation pump
 - 3. Domestic-water heater accessories.

2.03 SUBMITTALS

- A. Submit shop drawings in accordance with Division 1 and Section 22 04 00.
 - 1. Submit shop drawings and product data for each type and size domestic water heater proposed for this project. Indicate installation methods.
- B. Retain first paragraph below and "ASHRAE/IESNA 90.1 Compliance" Paragraph in "Quality Assurance" Article if required for electric, domestic-water heaters.
- C. Shop Drawings shall include:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

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2.04 INFORMATIONAL SUBMITTALS

- A. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- B. Warranty: Sample of special warranty.

2.05 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

2.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

2.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Periods: From date of Substantial Completion.
 - a. Electric, Storage, Domestic-Water Heaters: Three years.

PART 2 PRODUCTS

3.01 ELECTRIC, STORAGE, DOMESTIC WATER HEATER S

- A. Each water heaters shall be Dura-Power model as indicated below, manufactured by A. O. SMITH or an approved equal. All water heaters must be supplied by the same manufacturer. Heater shall be rated at wattage and voltage as scheduled below and listed by Underwriters' Laboratories. Models shall meet the standby loss requirements of the U.S. Department of energy and current edition of ASHRAE/IESNA 90.1. Tank shall have storage capacity as listed below. Each heater shall have 150 psi working pressure and be equipped with extruded high density anode rod. Electric heating elements shall be medium watt density with zinc plated copper sheath. Each element shall be controlled by an individually mounted thermostat and high temperature cutoff switch. The outer jacket shall be of backed enamel finish and shall be provided with full size control compartment for performance of service and maintenance through hinged front panels and shall enclose the tank with foam insulation. Electrical junction box with heavy duty terminal block shall be provided. The drain value shall be located in the

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front for ease of servicing. Heater tank shall have a three-year limited warranty as outlined in the written warranty. Fully illustrated instruction manual to be included.

1. 30-gallon Storage (DWH-2)
 - a. Model No. DEL-30 or an approved equal. Heater shall be rated at 4.5 kW, 208 volts, 1 phase, 60 cycle AC. Tank shall be thirty (30) gallon capacity with 20 gallon per hour recovery at 90°F rise.

3.02 RECIRCULATION PUMP S

A. (DHWP-1)

1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Casing: Bronze or stainless steel.
3. Impeller: Plastic.
4. Shaft: Stainless steel.
5. Motor: Single speed.
6. Minimum Working Pressure: 125 psig.
7. Maximum Continuous Operating Temperature: 220°F.
8. Design Capacity: 2 GPM
9. Design Head: 10 ftH₂O
10. Power: 1/25 HP, 120 volt single phase
11. Basis of Design: Taco Model 008-BC6.

3.03 DOMESTIC WATER HEATER ACCESSORIES

A. Domestic-Water Expansion Tanks: S

1. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
2. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.

3. Capacity and Characteristics:

a. Working-Pressure Rating: 150 psig

1) ET-2

(a) Capacity Acceptable: 0.94 gallon.

(b) Tank Volume: 2.1 gallon.

(c) Basis of Design: Proflo PFXT51.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

D. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

E. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.

F. Thermometers S: Shall be 4.5" tall digital vari-angle thermometer equal to Weiss DVU35. Thermostat shall be light powered (no batteries), mercury free with glass passivated thermistor sensor. Thermostat shall include 3-1/2" stem and LCD display with 1/2" digits. Thermometer shall be accurate to $\pm 1^{\circ}\text{F}$ with resolution to 0.1°F from the range of -50°F to 300°F .

G. Pressure gauges S: Shall be equal to Ashcroft bourdon tube type suitable for 125 psi service. Gauges shall be not less than 4" dial type with aluminum case and bar stock needle type gauge cock. Gauges shall be graduated in feet of water and psi. Minimum range 1.5 times normal operating pressure.

3.04 SOURCE QUALITY CONTROL

1. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

PART 3 EXECUTION

4.01 DOMESTIC-WATER HEATER INSTALLATION

A. Electric, Storage, Domestic-Water Heater Mounting: Install electric, storage, domestic-water heater where indicated on plans. Refer to installation detail on plumbing sheet P4.01.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Anchor domestic-water heaters to substrate.

- B. Install water-heater drain piping as indirect waste to spill by positive air gap into location as shown on drawings.
- C. Fill electric, domestic-water heaters with water and set storage temperature to 140°F.

4.02 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 11 16 Plumbing Piping. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

4.03 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 22 04 00 Plumbing General Requirements.

4.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION

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SECTION 22 34 00 - FUEL-FIRED, DOMESTIC-WATER HEATERS

SECTION 22 34 00 - FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ANSI Z21.10.3 - Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2019 (Reaffirmed 2024).
- B. ANSI Z21.18/CSA 6.3 - Gas Appliance Pressure Regulators; 2019 (Reaffirmed 2024).
- C. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2025).
- D. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- E. ASME B1.20.7 - Hose Coupling Screw Threads (Inch); 1991 (Reaffirmed 2024).
- F. ASSE 1010 - Performance Requirements for Water Hammer Arresters; 2025.
- G. NFPA 54 - National Fuel Gas Code; 2024.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- J. PDI-WH 201 - Water Hammer Arresters; 2017.

2.02 SUMMARY

- A. Section Includes:
 - 1. Commercial, power-burner, gas-fired, storage, domestic-water heaters.
 - 2. Domestic-water heater accessories.

2.03 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated.
- B. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

2.04 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- C. Source quality-control reports.

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- D. Field quality-control reports.
- E. Warranty: Sample of special warranty.

2.05 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

2.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.
- C. ASME Compliance:
 - 1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

2.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Five years.
 - 2) Controls and Other Components: One year(s).
 - b. Compression Tanks: Five years.

PART 2 PRODUCTS

3.01 COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS S (DWH-1)

- A. LP Gas water heater shall be A. O. Smith Cyclone Flex model # BTH-100 or equal, minimum 95% thermal efficiency, a storage capacity of 60 gallons, an input rating of 100,000 BTUs per

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hour, a recovery rating of 128 gallons per hour (gph) at 90°F rise and a maximum hydrostatic working pressure of 160 psi. Water heater shall include/have:

1. Modulating gas burner that automatically adjusts the input based on demand
2. Intelligent control system with 7" color touch display.
3. Powered anodes that are non sacrificial and maintenance free.
4. Seamless glass-lined steel tank construction, with glass lining applied to all water-side surfaces after the tank has been assembled and welded.
5. Meets the thermal efficiency and/or standby loss requirements of the DOE and current edition of ASHRAE/IES 90.10.
6. Foam insulation and a CSA Certified and ASME rated T&P relief valve.
7. A down-fired power burner designed for precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up.
8. Be approved for 0" clearance to combustibles.
 - a. The control shall be an integrated solid-state temperature and ignition control device with integral diagnostics, graphic user interface, fault history display, and shall have digital temperature readout. No charge connectivity shall be provided allowing for remote viewing and fault notification via app.
 - b. Water heater shall be certified by Underwriters Laboratories (UL), Inc., according to ANSI Z21.10.3 - CSA 4.3 standards governing storage type water heaters.
 - c. Venting: Direct Vent with a through roof concentric termination of both the vent and combustion air. The flue shall be PVC sealed vent material terminating at the roof with the manufacturers specified concentric vent termination. The air inlet pipe shall be PVC sealed pipe. 2" diameter PVC pipe is allowable for a total equivalent distance up to 75 ft and 3" diameter PVC pipe is allowable for a total equivalent distance up to 100 ft. Foam Core pipe is not an approved material for exhaust piping.
 - d. Provide water heater with manufacturer's condensate neutralization kit.
 - e. The water heater shall be equipped with a power cord. Supply voltage shall be 120 volt / 60 hertz / single phase.

3.02 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks S (ET-1):

1. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
2. Construction:

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- a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.
- 3. Capacity and Characteristics:
 - a. Working-Pressure Rating: 150 psig.
 - 1) Capacity Acceptable: 0.94 gallon
 - 2) Tank Volume: 2.1 gallon.
 - 3) Basis of Design: Proflo PFXT51
- B. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.
- C. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.
- D. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include 1/2-psig pressure rating as required to match gas supply.
- E. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.
- F. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.
- G. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
 - 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
- H. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- I. Pressure Relief Valves: Include pressure setting less than domestic-water heater working-pressure rating.
 - 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
- J. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.
- K. Thermometers S: Shall be 4.5" tall digital vari-angle thermometer equal to Weiss DVU35. Thermostat shall be light powered (no batteries), mercury free with glass passivated thermistor sensor. Thermostat shall include 3-1/2" stem and LCD display with 1/2" digits. Thermometer shall be accurate to $\pm 1^{\circ}\text{F}$ with resolution to 0.1°F from the range of -50°F to 300°F .

- L. Pressure gauges S: Shall be equal to Ashcroft bourdon tube type suitable for 125 psi service. Gauges shall be not less than 4" dial type with aluminum case and bar stock needle type gauge cock. Gauges shall be graduated in feet of water and psi. Minimum range 1.5 times normal operating pressure.

3.03 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect assembled domestic-water heaters and storage tanks specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.
- C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 EXECUTION

4.01 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete housekeeping pad.
 - 1. Maintain manufacturer's recommended clearances.
 - 2. Arrange units so controls and devices that require servicing are accessible.
 - 3. Anchor domestic-water heaters to substrate.
- B. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.
- C. Install gas-fired, domestic-water heaters according to NFPA 54.
 - 1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
 - 2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 - 3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
- D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

- E. Install combination temperature-and-pressure relief valves in water piping for domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.
- G. Install thermometer on outlet piping of domestic-water heaters and where indicated in plans and details.
- H. Install pressure gauges where indicated in plans and details.
- I. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.
- J. Fill domestic-water heaters with water.
- K. Charge domestic-water compression tanks with air.

4.02 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 11 16 Plumbing Piping. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

4.03 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 22 04 00 Plumbing General Requirements.

4.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

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SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Water closets
 - 2. Urinals
 - 3. Lavatories
 - 4. Sinks
 - 5. Mop sinks
 - 6. Floor Drains/Sinks
 - 7. Electric Water Cooler
 - 8. Showers/Shower Drains
 - 9. Wall Hydrant
 - 10. Outlet Boxes

1.02 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

1.03 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated S. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For plumbing fixtures indicated O/M to include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 General Requirements for Plumbing.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

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1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 - PRODUCTS

2.01 GENERAL

2.02 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains; 2019.
- B. ASME A112.6.7 - Sanitary Floor Sinks; 2022.
- C. ASME A112.18.1 - Plumbing Supply Fittings; 2024.
- D. ASSE 1010 - Performance Requirements for Water Hammer Arresters; 2025.
- E. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.
- F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011 (Reaffirmed 2016).
- G. UL 399 - Drinking Water Coolers; Current Edition, Including All Revisions.
- H. Provide and install all fixtures as indicated on drawings and herein specified with all supplies, waste and vent connections, all fittings, all necessary supports, faucets, valves and traps. Furnish individual stops on supply pipes of all fixtures except for supply pipes to flush valves with integral stops. All exposed trimmings and fixture supply pipes to be polished chromium plated finish. All enameled cast iron fixtures shall be furnished with acid-resisting enamel. Faucet locations shall be uniform, with cold water faucet on the right side of the fixture and hot water on the left side. Fixture color shall be white. Joints formed where fixtures come in contact with walls or floors shall be sealed. Refer to drawings for quantities, locations and mounting heights.
- I. Trade names and catalog numbers are used herein for the designation of fixtures and accessories are used for establishing a standard of quality and shall not be interpreted as to limit competition. The equivalent products of others may be used by the Contractor if they are considered equal to that specified and are accepted in writing by the Engineer.

2.03 WATER CLOSET S

- A. (WC-1) Water Closets: Toto Water Closet CT728CUG or approved equal. Water closet shall be ADA-Compliant. 1.6 gal. per flush, white vitreous china, 1-1/2" inlet top spud, wall mounted, elongated front rim, direct-fed siphon jet action. Furnish with open front less cover seat equal to Toto SC 534, American Standard 5901.100, Church No. 9500C, or accepted equal by others. Furnish water closet with self-powered, sensor operated, hydroelectric ecopower 1.6 gpf flush valve system similar to Toto TET1GA#CP for 1-1/2" top spud connection with inlet angle stop

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and outlet vacuum breaker. Flush valve shall include manual override. Bowl rim height 16.5" above floor.

- B. (WC-2) Water Closets: Toto Water Closet CT725CUFG or approved equal. Water closet shall be ADA-Compliant. 1.6 gal. per flush, white vitreous china, 1-1/2" inlet top spud, floor mounted, elongated front rim, direct-fed siphon jet action. Furnish with open front less cover seat equal to Toto SC 534, American Standard 5901.100, Church No. 9500C, or accepted equal by others. Furnish water closet with self-powered, sensor operated, hydroelectric ecopower 1.6 gpf flush valve system similar to Toto TET1GA#CP for 1-1/2" top spud connection with inlet angle stop and outlet vacuum breaker. Flush valve shall include manual override. Bowl rim height 16.5" above floor.

2.04 URINAL S

- A. (UR-1) Urinal: Toto UT447E or approved equal. Urinal shall be ADA-Compliant, 0.5 gal. per flush, white vitreous china, wall hung, washout flush action. Furnish urinal with manual flush valve as scheduled below. Provide urinal with wall hanger attachments. Rim height ADA height where indicated. Furnish urinal with self-powered, sensor operated, hydroelectric ecopower 0.5 gpf flush valve system similar to Toto TEU1LA12#CP for 3/4" top spud connection with inlet angle stop and outlet vacuum breaker. Flush valve shall include manual override

2.05 LAVATORIES S

- A. (LAV-1) Lavatory: Sloan model AD-82000 BASY two station wash system. Provide color selection for architect in product data submittal. Solid surface Corian, 60" in length, wall mounted 2 station wash basin, cast molded as one piece. Provide with battery powered, sensor operated deck mounted faucet and soap dispenser. Faucet shall be Sloan EFX-250, deck mounted, sensor operated, battery powered with chrome finish, 0.5 gpm. Soap dispenser shall be Sloan model ESD-500, deck mounted, sensor operated, battery powered with chrome finish.
- B. (LAV-2) Lavatories: Toto "Rendezvous" LT579G, vitreous china undermount lavatory, oval 14" x 17". Furnish lavatory with self-powered, sensor operated, hydroelectric ecopower 0.5 gpm deck mounted faucet, Toto faucet model T25S53E#CP. Controller shall be below deck mounted. Furnish with open grid strainer. All exposed piping, connections, etc. shall be chrome plated.
- C. Each lavatory shall include a tempering valve TMV-2, lavatory fittings, protective shielding piping enclosure and supports.
- D. Lavatory Fittings: Fittings for each lavatory shall be chrome finish close pattern supply pipe with 3/8" valve, loose key stop and handle, 3/8" thread inlet, escutcheon, and 3/8" flexible riser; chrome finish adjustable cast brass "P" trap with swivel joint, cleanout plug, 17 gage tubing drain to wall, slip joint inlet, escutcheon and set screw, inlet and outlet sizes to be as required by fixtures.
- E. Protective Shielding Piping Enclosure: The drain and water supplies shall be insulated with protective shielding enclosures from the bottom of the lavatory to wall. Manufacturers that may be incorporated, but not limited to, include: Truebro "Lav Guard" 102 W with accessory 105, Plumberex "Pro extreme" X4333 with accessory X4114 and McGuire "ProWarp" 2125C or 2125PW WC. Shielded piping enclosure shall comply with ICC/ANSI A117.1 requirements.

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2.06 SINKS S

- A. (S-1) Sink: Elkay model ELUHAD191645, 21-1/2" x 18-1/2" overall with one 19" x 16" x 4-3/8" deep bowl. Sink shall be ADA-complaint. Sink shall be undermount. Furnish sink with pull-down spray-head faucet similar to Kohler Crue K-22972, ADA-compliant, single hole deck mount, 1.5gpm flowrate faucet with Matte Black finish. Provide 3-5/8" perfect drain with removable basket strainer with open/close stopper and tailpiece for each bowl. Spout outlet shall have aerator. Provide under counter chrome plated stops and "P" trap.
- B. Note: Sinks that are handicap accessible shall be provided with protective shielding piping enclosures. Refer to Specification section 2.04.E above for details.

2.07 MOP SINKS S

- A. (MS-1) Mop Sinks: Fiat model MSB2424 or accepted equal, Molded high density composite basin with PVC Drain body, Stainless steel strainer and gasketed outlet connection, 24" x 24" size, 10" deep, color white, furnished with Fiat 830-AA model service sink faucet, vacuum breaker, integral 3/4" hose threaded outlet, pail hook and wall brace. Complete unit shall be installed and sealed in accordance with manufacturer's recommendations.

2.08 FLOOR DRAINS/SINKS S

- A. (EFD-1) Emergency Floor Drains: Adjustable on-grade floor drain, Sioux Chief model 832 series. Drain shall allow adjustment before and after the concrete pour. PVC Base adaptor, gray ABS head adapter/coring sleeve, and high-impact polymer coring plug. Provide with 5-1/2" round stainless steel strainer. ASME A112.6.3.
- B. (FD-1) Floor Drains: Adjustable on-grade floor drain, Sioux Chief model 832 series. Drain shall allow adjustment before and after the concrete pour. PVC Base adaptor, gray ABS head adapter/coring sleeve, and high-impact polymer coring plug. Provide with 5-1/2" round stainless steel strainer. ASME A112.6.3.
- C. (FD-2) Floor Drains: Adjustable on-grade floor drain, Sioux Chief model 832 series. Drain shall allow adjustment before and after the concrete pour. PVC Base adaptor, gray ABS head adapter/coring sleeve, and high-impact polymer coring plug. Provide with 5-1/2" round stainless steel strainer, extended rim. ASME A112.6.3.
- D. (FS-1) Shower Drains: On grade floor sink, Sioux Chief 827-2B-SPK1. 12" square x 8" deep, no-hub connection, cast iron body and anchor flange, white enamel coated interior and 304 SS open half-grate, aluminum dome strainer, aluminum debris bucket, ASME A112.6.7.
- E. Brass body with outer locknut design, compression gasket connection for schedule 40 PVC piping. Provide 4-1/4" diameter drain, stainless steel with strainer to match shower drain recess, ASME A112.6.2
- F. Furnish each floor drain with sureseal waterless inline drain trap seal as manufactured by RectorSeal. Waterless trap seal shall be constructed of HDPE (high density poly-ethylene) housing with heavy duty silicone diaphragm and soft EPDM rubber sealing gasket. Waterless trap seal shall install in the outlet of the drain body or drain outlet to protect floor drain trap seal from evaporation.

2.09 ELECTRIC WATER COOLER S

- A. (EWC-1) Electric Split-Level Water Coolers with Bottle Filler Station: Haws model number 1212S. Unit shall be barrier free bi-level unit, vandal resistant, air cooled, stainless steel top, 120 volts, single phase, 60 cycle hermetically sealed unit. Cooler shall provide 8.0 gph of filtered 50°F water at 90° F ambient and 80°F inlet water. Bottle filling unit shall be on the low side and shall include an electronic sensor for no-touch activation with an automatic 20-second shut-off timer, electronic display. and shall provide 1-1.5 gpm flow rate with laminar flow to minimize splashing. Cooler shall include antimicrobial protected plastic components to prevent mold and mildew. Cooler shall include pushbutton-activation and water-efficient bubbler. Bottle Filling unit shall meet ADA guidelines for parallel approach. Cooler shall meet ADA guidelines for frontal or parallel approach. Unit shall be lead-free design which meets Safe Drinking Water Act and is certified to NSF/ANSI 61 and California AB1953. Unit shall be certified to UL 399.
- B. Water Cooler Supports: Furnish and install water cooler support at recommended by water cooler manufacturer for proposed installation.

2.10 SHOWER S

- A. (SH-1) ADA Compliant shower fixture system. Provide Zurn model Z7121-SS-LH-DV2-P-HW single handle pressure balancing mixing shower valve, nickel chrome plated exposed surfaces, bronze stem, stainless steel balancing piston, integral service stops, adjustable temperature limit stop screw, and 3-function diverting valve. Provide standard shower head and hand held shower head, 2.5 gpm. Provide 24" slide bar, supply elbow, 60" metal hose and mounting hardware. Provide chrome curtain rod and shower curtain with stainless steel hooks. One piece shower shall be Comfort Designs model XSS 6239, white finish, fold-up seat, grab bars or approved equal. ASME A112.18.1.
- B. (SD-1) Shower Drains: Adjustable shower drain, Sioux Chief 827-2B-SPK1. Brass body with outer locknut design, compression gasket connection for schedule 40 PVC piping. Provide 4-1/4" diameter drain, stainless steel with strainer to match shower drain recess, ASME A112.6.2.

2.11 .WALL HYDRANT S

- A. (WH-1) Wall Hydrant: Woodford model B65 or approved equal. Concealed box type, automatic draining, freezeless, with single check hose connection anti-siphon vacuum breaker. ASSE 1011. ASSE 1019-B, 3/4" inlet and outlet. Exterior finish rough brass.

2.12 OUTLET BOXES S

- A. (SOB-1) Recessed in-wall water supply box. Sioux Chief 696 series OxBox. Galvanized steel bracket, ABS frame, Brass or CPVC valve shank and forged brass 1/4 turn valve. Provide with 304 SS water hammer arrestor. 1/2" inlet and 1/4" compression supply. Outlet box shall be NFS-372 complaint, Arrestor shall meet ASSE 1010 and valve shall meet ASME A112.18.1.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify walls and floor finishes are prepared and ready for installation of fixtures.

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- B. Verify electric power is available and of correct characteristics.
- C. Confirm millwork is constructed with adequate provision for installation of undermount lavatories and sinks.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated on the drawings.

3.03 INSTALLATION

- A. The completed installation and all materials and equipment shall conform to all applicable portions of National Fire Protection Association Codes, Uniform Statewide Building Code, International Plumbing Code, local ordinances, other regulations and standards listed herein, and all other governing codes and regulations. These are intended as a minimum and shall be exceeded if required by the specifications, the drawings, or governing codes and regulations. In the event of conflict between the codes, standards, or regulations, and information contained in the contract documents, the applicable code, standard, or regulation shall take precedence and no extra compensation will be allowed.
- B. Install each fixture with trap, easily removable for servicing and cleaning.
- C. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- D. Install components level and plumb.
- E. For ADA accessible water closets, install flush handle to wide side of stall.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 FIELD QUALITY CONTROL

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit use of fixtures before final acceptance.

END OF SECTION

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SECTION 23 00 10 - HVAC GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Every item of labor, materials, equipment and appurtenances for installing complete new Heating, Ventilating and Air Conditioning Systems included in Division 23 of the Specifications.
 - a. DRAWINGS
- C. The mechanical Drawings are diagrammatic in nature and show the general arrangement of all ductwork, piping, equipment and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the mechanical Drawings, it is not feasible to indicate all offsets, fittings and accessories that may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.
- D. Where discrepancies in scope of work as to which Trade provides specific items, such as starters, disconnects, flow switches, electrical control components, etc. exist, such conflicts shall be reported to the Engineer. If such action is not taken, the Contractor, as applicable, shall furnish such items as part of his work, for complete and operable systems and equipment, as determined by the Engineer.
 - a. REGULATIONS AND STANDARDS
- E. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a minimum and shall be exceeded if required by the specifications or the Drawings. In the event of conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standards, or regulation shall take precedence.
 - a. INSPECTION CERTIFICATES
- F. The Contractor shall furnish three copies of certificates of final acceptance to the Engineer from all inspection authorities having jurisdiction.

1.02 SUBSTANTIAL COMPLETION INSPECTION

- A. The Engineer will visit the site for the purpose of conducting a substantial completion inspection once the following items have been met by the Contractor:
- B. All HVAC systems shall be complete, operational and under automatic control.

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1. HVAC systems cleaning, balancing, and testing as described in Section 23 05 93 shall be complete and the final report shall be approved by the Engineer.
 2. Letters, signed by representatives of the manufacturer for the make-up air unit and heat pump and air conditioning units shall be provided attesting that their respective equipment has been started, tested, and set to operate safely and at the control points required as an integral part of the systems in which they are installed.
 3. The Contractor shall provide certification from an authorized official of the equipment manufacturer(s) stating that all refrigerant piping as described in Section 23 20 00 and specialties have been installed in accordance with the manufacturer's recommendations.
 4. The Contractor shall attest by letter that all equipment has been wired and tested to verify that the indicated sequence of motor control is established, that all safety controls function properly, that all motor protective devices are sized correctly, and that the systems are operating at the proper set points.
- C. All discrepancies noted in the substantial completion report shall be corrected prior to the final inspection. The Contractor shall provide a detailed item-by-item description of all corrections made for each item on the substantial completion discrepancy list prior to scheduling final inspection by the Engineer. Additional visits required after the final inspection, for the reason that previously documented discrepancies had not been corrected at the time of the final inspection, will be made at the Contractor's expense.
- a. ASBESTOS
- D. Asbestos Free Materials: The intention of these Drawings and specifications is that there are no asbestos-containing materials installed on this project. To the best of the Architects and Engineers knowledge, none of the material or equipment specified herein or shown on the Drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos-containing materials were used for or in the construction of this project.
- a. MATERIALS AND WORKMANSHIP
- E. Equipment and material used in the project shall be new and undamaged. The mechanical installation shall fit into the space allotted and shall allow adequate and acceptable clearances for entry, servicing and maintenance. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise. Work shall be performed by mechanics or tradesmen skilled in the trade involved.
- F. All ductwork, piping and conduit shall be installed in a neat and organized manner, parallel to other work and the nearest building elements, unless specifically shown otherwise on the Drawings.
- G. Equipment and materials shall be suitable for use in the environment in which they are installed. Equipment exposed to outside conditions shall be adequately protected from the weather, manufactured from materials suitable for outdoor use, and designed specifically for use in outdoor environments.

a. SUBMITTALS

- H. Submit shop drawings, product data and samples in accordance with Division 1 for all items as specified in related sections of these specifications. Electronic submittals shall be required and shall be returned to the contractor electronically as well. Refer to Division 1 specifications to determine exact submittal submission requirement procedures. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements. Contractor's stamp shall identify the specification section, paragraph and page number for which the submittal is being made. Shop drawings will be reviewed only for general compliance with the Contract Documents. Review will not include correctness of details, proper configuration, utility connections, dimensions, sizes, quantities, and the like. Any submission which has not been reviewed and stamped by the Mechanical Subcontractor will not be reviewed by the Engineer. No reviews prior to award of Contract will be considered or accepted. Re-submissions of shop drawings, product data and samples shall include the entire original submittal. Partial submittals will not be reviewed by the Engineer.

- I. Submissions will be stamped by the Engineer in one of the following ways:

"NO EXCEPTIONS TAKEN"	NO EXCEPTIONS ARE TAKEN AND SUBJECT TO COMPLIANCE\ WITH THE CONTRACT DOCUMENTS.
"MAKE CORRECTIONS NOTED"	MINOR CORRECTIONS ARE NOTED AND A RE-SUBMITTAL IS NOT REQUIRED SUBJECT TO COMPLIANCE WITH THE CORRECTIONS AND THE CONTRACT DOCUMENTS.
"CORRECT AND RESUBMIT "	THE SUBMITTED MATERIAL, METHOD OR SYSTEM MEETS THE INTENT OF THE SPECIFICATIONS, YET HAS INSUFFICIENT DATA TO DETERMINE COMPLIANCE WITH THE CONTRACT DOCUMENTS. RE-SUBMITTAL IS REQUIRED.
"REJECTED"	THE SUBMITTED MATERIAL, METHOD OR SYSTEM DOES NOT MEET THE INTENT OF THE SPECIFICATIONS, OR HAS INSUFFICIENT DATA TO DETERMINE COMPLIANCE WITH THE CONTRACT DOCUMENTS.

- J. Submission Procedures:

1. If a submission is satisfactory to the Engineer, the Engineer will annotate the submission, "No Exceptions Taken" or "Make Corrections Noted" and transmit to the Contractor. If a resubmission is required, the Engineer will annotate the submission "Correct and Resubmit" or "Rejected" and transmit to the Contractor for appropriate action.

2. The Contractor shall revise and resubmit submissions as required by the Engineer until submissions are acceptable to the Engineer.
 3. Approval of a working and/or shop drawings by the Engineer will constitute acceptance of the subject matter for which the drawing was submitted and not for any other structure, material, equipment or appurtenances indicated as shown.
 4. The Engineer's review of the Contractor's submissions shall in no way relieve the Contractor of any of his responsibilities under the Contract. An approval of a submission shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Documents.
 5. Where as-built drawings, record drawings and specifications are available and when provided to the Contractor for use in performing the work, the Contractor shall verify the content of such drawings and specifications, the suitability of their use in performing the work and their accuracy for the purposes in which the Contractor intends to use any record or historical documents which may be obtained. In no case shall the Contractor assume that such documents reflect a true and accurate record of the construction. Acceptance of any such materials, records, and/or drawings shall in no way result in additional cost to the Owner should an error and/or omission in these documents result in additional costs to the Contractor.
- K. Equivalents: Manufacturers, trade names, and model numbers indicated herein and on Drawings shall be interpreted as establishing a standard of quality and basis of design and shall not be construed as limiting competition. Unless definitely stated otherwise and upon complying with Division 1, the Contractor may use any article which, in his judgment is equal to that specified and is accepted by the Engineer. However, when the contractor submits on non basis of design materials, the contractor shall indicate all required items to show that the submitted product is equal to the basis of design product. If the engineer can't determine from the submitted information that the submitted product is equal or better than the basis of design product, the submittal shall not be approved. The engineer shall have the final word on whether an alternate product is considered equal. Where three (3) or more manufacturers are named in the specifications for any item, the Contractor shall use one of the named manufacturers. No others will be reviewed or accepted. Manufacturers listed first in these specifications and on Drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes, capacities, etc. of all other manufacturer's items, both named or proposed. If the equipment necessitates changes in ductwork, piping, wiring or other building systems from that indicated on the Drawings, the Contractor shall be responsible for all additional costs included and notify other trades. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval.
- L. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials where specifically required by specification and all items identified with an S behind the product title. Submittals not required by the Contract Documents will not be reviewed.
- M. Shop Drawing manual(s) shall be submitted in accordance with Division 1 and shall include a complete product index, a copy of all approved shop drawings, and the name, address and

telephone number of supplier or nearest representative. The manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

- N. Operation and Maintenance manual(s) shall be submitted in accordance with Division 1 and Section 23 01 00 and shall include a complete product index in each volume, installation and maintenance data, sequence of controls, parts lists, a copy of all approved shop drawings and the name, address and telephone number of supplier or nearest representative. All mechanical devices, equipment and systems marked O/M in these specifications shall be included and all other such mechanical items that will require servicing before the duration of its useful life has been reached. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.
- O. The Mechanical Contractor shall submit 1/4 inch per foot shop drawing(s) showing all ductwork, piping and equipment shown by the plans and specifications. The drawing(s) shall be coordinated with structural drawings and all other trades, especially the architectural, fire and sprinkler, plumbing and electrical. A reproducible drawing shall be corrected to "as built" and submitted to the Owner at the termination of the project.

1.03 WARRANTY

- A. The Contractor shall provide a warranty for a period of one year for all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.
- B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.
- C. Refer to Division 1 for additional warranty requirements.
- D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

a. VERIFYING MEASUREMENTS AND CONDITIONS

- E. The exactness of grades, elevations, dimensions, or locations given on the Drawings, is not guaranteed by the Engineer. The Contractor shall, therefore, satisfy themselves as to the accuracy of all grades, elevations, dimensions and locations. In all cases of interconnection of their work with existing or other work, they shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to verify all such grades, elevations, locations, or dimensions shall be promptly rectified by the contractor without cost to Owner.

a. COORDINATION OF WORK

- F. General: The Contract Documents indicate the extent and general arrangement of the mechanical systems. The Contractor shall be responsible for the coordination and proper relation of the mechanical work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.

- G. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.
- H. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the mechanical Drawings are intended only as a guide to indicate relative locations of the mechanical work. Refer to architectural and structural Drawings for building construction details. The Contractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination shall be completed to verify dimensions and characteristics for the installation of each system.
- I. Unless necessitated by equipment access or otherwise indicated in the Contract Documents, all piping, ductwork, and conduit concealed above ceilings and in finished or utility spaces shall be routed as high as possible.
- J. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall provide manual air vents and drains as required for his work to affect these offsets, transitions and changes in direction, as applicable.
- K. Cutting and Patching: See Division 1.
- L. Roughing-In: Verify the locations of other buildings machines, door swings, block coursing, alignment of tile end and other similar features before roughing-in for mechanical equipment components and/or controls.
- M. Damage to Other Work: Each Contractor is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Contractor who installed the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Contractor responsible for the damage.

a. EQUIPMENT INSTALLATION

- N. General: Equipment shall be installed in accordance with manufacturer's instructions to conform with the details and application indicated. Where manufacturer's recommendations or installation instructions require options or accessories not specified, they shall be included and installed by the Contractor.
- O. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes but is not limited to frames or supports for items such as air conditioning equipment and other similar items requiring supports. Provide additional supports under air handlers where required.
- P. Service Area: All equipment and appurtenances shall be located to permit adequate service clearance in accordance with manufacturer's recommendations and as otherwise required. Service clearance shall include but not be limited to service and removal of filters, coils, motors, controls and removal of equipment sections. All piping, ductwork, and other equipment shall be located outside of the service area or shall be flanged for easy removal to facilitate equipment service. All equipment shall be located with sufficient distance from building features, structural

components, and the equipment of other trades. Service clearance in front of electrical panels shall be minimum as required by National Electric Code (NEC) where applicable.

- Q. Temporary Requirements: Temporary filters shall be provided for all fans that are operated during construction. Return openings, grilles, and registers shall be provided with temporary filters to prevent the intrusion of dust and particulate into the return air ductwork. Temporary filter shall have a minimum efficiency of MERV 8 in accordance with ASHRAE 52.2. Openings in equipment shall be kept plugged at all times until connection is made to the system. The ends of all pipes, ducts and equipment openings shall be kept plugged or capped properly with approved devices. Approved devices are items such as specially molded plastic caps, pipe plugs, test plugs and sheet metal caps.

1.04 SLEEVES AND INSERTS

- A. General: Sleeves and inserts shall be provided and correctly located in the structure, as require for the work.
- B. Inserts shall be steel and proper size for loads encountered.
- C. Sleeves shall be provided for all pipes passing through concrete or masonry walls, partitions or slabs installed during construction of the wall, partition or slab. Sleeves placed horizontally in walls shall be standard weight ASTM A53 steel pipe of length equal to thickness of wall. Those placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors of rooms where hose bibs or floor drains occur, or on raised platforms, shall be standard weight steel pipe projecting 2" above the floor All sleeves shall be of sufficient diameter to clear bare or covered pipes by 1/4" all around except sleeves on lines subject to movement by expansion which shall clear the bare pipe or insulation on insulated pipe at least one inch all around.

1.05 ACCESS DOORS

- A. Provide for all concealed valves, controls, dampers, junction boxes, equipment, or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. The Mechanical Contractor shall provide locations of all access doors such that service may be safely performed from a ladder, lift, or platform without the need for support from the ceiling system. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction.

1.06 ELECTRICAL WIRING AND EQUIPMENT

- A. Wiring, low voltage (100 volts or less) control wiring shall be provided as a part of Division 23 in strict accordance with Division 26 and shall be in accordance with manufacturer's recommendations to comply with the sequence of control indicated. Verify that wiring of all motors and controls required by equipment furnished is accomplished for the correct sequence of operation.
- B. Wiring, line voltage (101 volts or higher) power or control wiring shall be furnished and installed under Division 26.

- C. Disconnects shall be provided for each item of equipment under Division 26 unless specified otherwise in other sections.
- D. Miscellaneous manual or automatic control and protective or signal devices required for the sequence of operation indicated for mechanical equipment shall be provided under the section of the specifications where the item of equipment is specified unless indicated otherwise.

1.07 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Contractors shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the Mechanical systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the Mechanical and Electrical systems.

1.08 CONSTRUCTION STATUS REPORT

- A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

1.09 GRAPHICS DATABASE

- A. This project's Computer Aided Design & Drafting (CADD) drawing files may be obtained directly from the Engineer for use in preparing computer graphics specific to this project.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 23 01 00 - OPERATION AND MAINTENANCE OF HVAC SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. To aid the continued instruction of operating and maintenance personnel, and to provide a source of information regarding the products incorporated into the work, furnish and deliver the data described in this section and in pertinent other sections of these specifications.
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 05 00 – Common Work Results for HVAC
 - 3. Section 23 20 00 – HVAC Piping
 - 4. Section 23 30 00 – HVAC Air Distribution
 - 5. Section 23 70 00 – Central HVAC Equipment
 - 6. Section 23 80 00 – Decentralized HVAC Equipment

1.02 SUBMITTALS

- A. Unless otherwise directed in other sections, or in writing by the Engineer, submit electronic copy of the final manual to the Engineer for approval prior to indoctrination of operation and maintenance personnel.
- B. Operation and Maintenance manual(s) shall be submitted in accordance with Division 1 and shall include a complete product index, installation and maintenance data, sequence of controls, parts lists, a copy of all approved shop drawings and the name, address and telephone number of supplier or nearest representative. All mechanical devices, equipment and systems marked O/M in these specifications shall be included and all other such mechanical items that will require servicing before the duration of its useful life has been reached. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

1.03 QUALITY ASSURANCE

- A. In preparing data required by this section, use only personnel who are thoroughly trained and experienced in the operation and maintenance of the described items, completely familiar with the requirements of this section, and skilled communicating the essential data.

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PART 2 PRODUCTS

2.01 INSTRUCTION MANUALS

- A. Where instruction manuals are required to be submitted under other sections of these specifications, prepare in accordance with the provisions of this section.
- B. Format:
 - 1. Size: 8-1/2" x 11" preferred. 11"x17" or larger may be used where required
 - 2. Text: Typed (Hand printed or written is not acceptable)
 - 3. Separate each portion of the manual with tabbed index sheets or similar. Provide a table of contents with embedded links to each section of the manual. All portions of the manual shall include bookmarks. A lack of Table of Contents or Bookmarks will result in rejection of the manual by the engineer.
 - 4. Format: PDF
- C. Provide front and back covers for each manual, using durable plastic material approved by the A.E, and clearly identified on the front cover with at least the following information.

OPERATING AND MAINTENANCE INSTRUCTIONS

FOR

(ITEM/SYSTEM NAME AND DESCRIPTION)

(NAME AND ADDRESS OF CONTRACTOR AND SUB-CONTRACTOR)

(GENERAL SUBJECT OF THIS MANUAL)

(NAME AND ADDRESS OF ENGINEER)

(ENGINEER'S APPROVAL AND DATE APPROVED)

- A. Contents:
 - 1. Neatly prepared and typewritten detailed table of contents with electronic links to each section.
 - 2. Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly, and reassembly.
 - 3. Complete nomenclature of all parts of all equipment.
 - 4. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
 - 5. Copy of all guarantees and warranties issued.

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6. Manufacturer's bulletin, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
7. Such other data as required in pertinent sections of these specifications.

PART 3 EXECUTION

10.01 INSTRUCTION MANUALS

- A. Revisions:
 1. Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of the Manual with the Engineer.

END OF SECTION

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SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Hangers and Supports for HVAC Systems
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 01 00 – Operation and Maintenance of HVAC Systems
 - 3. Section 23 05 48 – Vibration Controls for HVAC Systems
 - 4. Section 23 05 53 – Identification for HVAC Systems
 - 5. Section 23 05 93 – Testing, Adjusting and Balancing for HVAC
 - 6. Section 23 20 00 – HVAC Piping
 - 7. Section 23 30 00 – HVAC Air Distribution
 - 8. Section 23 70 00 – Central HVAC Equipment
 - 9. Section 23 80 00 – Decentralized HVAC Equipment

1.02 REFERENCES

- A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.
- B. American Society of Mechanical Engineers (ASME)
- C. National Electrical Manufacturers Association (NEMA)
- D. Underwriters Laboratories, Inc. (UL)

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Division 1 and Section 23 00 10.
- B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.
- C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

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PART 2 PRODUCTS

2.01 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

- A. Suspended horizontal piping shall be supported by adjustable wrought steel clevis hangers. Where supports bear on copper pipe they shall be copper plated. Chain, strap or other makeshift devices will not be permitted as hangers or supports.
- B. Maximum pipe support spacing for copper tubing 1-1/4" and smaller shall be supported six feet on center.
- C. Pipe and suspended equipment hanger rods shall be attached to the top chord only on steel joists and beams by joist or beam clamps without welding. Welding of support rods and connection at any place other than the top chord will not be permitted unless written approval is granted by the Engineer and the Architect. C-clamp hangers shall be limited to 50 lb. or less when used at joists. Threaded rod shall be used through joist chords for loads greater than 50 lb.
- D. Duct supports shall consist of one of the following:
 - 1. Where Concealed: Not less than 1" by 16 gauge galvanized steel strap hangers spaced in accordance with SMANCA standards for size of weight of ductwork. Heavier ductwork of ducts wider than 48 inches shall be supported by trapeze angles supported by hanger rods. Straps shall be lapped across the bottom ducts a minimum of 1 inch. Ductwork shall be supported from the building structure. Ductwork shall not be supported from the ceiling system or any other building services.
 - 2. Where Exposed: Ductwork supports shall be a wire rope and cable lock system, equal to Duro Dyne DTCL12. All Cable Locks shall have an Ultimate Breaking Strength (U.B.S.) of at least 5 times the wire rope published Working Load Limit (W.L.L.). All wire rope shall have a U.B.S. of 5 times the published W.L.L. Wire ropes shall be of the size and spaced per manufacturers printed specifications.
- E. Floor, ground or platform duct supports shall be factory fabricated rubber pedestals as manufactured by Dura-Block or equal, including slotted channel or similar accessory as required for the installation. Supports shall be located to adequately support duct with no more than 4 feet of duct unsupported.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's recommendations.
- B. Hangers shall be spaced so that the supported load does not exceed the load recommended by the manufacturer. The supported load shall not overstress the building structural members. Where required hangers for the suspension of heavy items do not correspond with the building structural members, provide supplemental steel members fastened to the building structural members.

END OF SECTION

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SECTION 23 05 48 - VIBRATION CONTROLS FOR HVAC SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Vibration Isolators
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 20 00 – HVAC Piping and Pumps
 - 3. Section 23 30 00 – HVAC Air Distribution
 - 4. Section 23 70 00 – Central HVAC Equipment
 - 5. Section 23 80 00 – Decentralized HVAC Equipment
 - 6. Division 26 – Electrical

1.02 QUALITY ASSURANCE

- A. All vibration control apparatus shall be supplied by a single recognized manufacturer. The supplier of noise and vibration control equipment shall supervise, inspect and approve the installation of their equipment. The supplier shall submit a letter to the Engineer at the conclusion of the project stating that all items have been installed properly and that all equipment is adequately isolated.

1.03 SHOP DRAWINGS

- A. Submit shop drawings and product data in accordance with Division 1.
- B. Shop drawings, cuts, diagrams, catalog data sheets or such other data necessary to fully describe and substantiate compliance with the specifications shall be submitted for all (seismic restraints,) vibration isolation equipment and materials. The Contractor shall submit drawings for review stating the static deflection, load capacity and location of the isolators, inertia slab dimensions and installation instructions.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Kinetics Noise Control, Vibration Mountings and Control, Inc., Vibration Eliminator Co., Inc., Mason Industries or Amber/Booth Company.
- B. Model numbers used in this specification are those of Kinetics Noise Control and are included to establish a standard of quality.

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2.02 ISOLATOR TYPES

A. Floor Mounted Equipment:

1. Type 1N neoprene isolation pads shall be single rib or crossed, double rib neoprene in shear pads in combination with steel shims. Neoprene pads shall be molded using 2500 psi tensile strength, oil resistant compounds. Type 1N units shall be Kinetics Model NPS, NPD, NGS, or NGD.
2. Type 2F neoprene isolation mounts shall incorporate a cast-in tapped steel load plate, to permit bolting to supported equipment. The neoprene pad shall be molded using 2500 psi tensile strength, oil resistant compounds, and shall have no color additives in the compound. The neoprene isolator shall be selected to achieve the minimum operating static deflection tabulated, while not exceeding the published load capacity for the isolator used. Each neoprene isolation mount shall be externally color coded to identify load capacity, and shall incorporate a cast-in drilled steel anchor/base plate. Type 2F units shall be Kinetics Model RD.

a. Suspended Equipment:

3. Type 3S hangers shall consist of a steel spring and a elastomer-in-shear isolator placed in series and encased in a welded steel bracket. Springs shall be supported either with a neoprene cup or a metal base plate complete with a ribbed neoprene pad, minimum 6 mm (0.25") thick, bonded to the base plate. Springs shall be selected to provide operating static deflections as required. Springs shall be color coded or otherwise identified to indicate load capacity. In capacities up to 5,000 lbs., springs shall be replaceable. Springs shall be assembled between a top and bottom steel load plate. The upper load plate shall be provided with a steel leveling bolt lock nut and washer for attachment to the supported equipment. The lower load plate shall have a non-skid noise isolation pad bonded to the bottom and have provisions for bolting the isolator to the supporting structure. Springs shall be color coded for ease of load capacity identification and removable for field correction of overloaded hangers. The elastomer noise stop pad shall be selected to operate within the published load range for the pad for each spring capacity when placed in the bracket used. The hanger bracket shall be designed to carry five (5) times overload without failure, and shall allow up to 15° rod misalignment without metal to metal contact. Type 3S units shall be Kinetics Model SRH.
4. Type 2S hangers shall consist of an elastomer-in-shear isolator encased in a welded steel bracket. The elastomer shall be bonded to the hanger bracket and shall be selected to support the load within its published load rating. The hanger bracket shall be designed to carry a five (5) times overload without failure and allow up to 15° rod misalignment without short circuiting. Type 2S hanger shall be Kinetics Model RH.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Equipment: All equipment listed hereinafter shall be isolated from the structure and fixed parts by means of resilient vibration and noise isolators. Isolators for floor and roof mounted equipment shall be solidly anchored to the support base or floor and to the supported equipment unless indicated otherwise.

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- B. Ductwork: Flexible connections shall be incorporated in the ductwork adjacent to all air moving units as part of the sheet metal work.

3.02 MINIMUM VIBRATION ISOLATOR STATIC DEFLECTION

Type of Equipment	Isolator Type	Deflection Inches
Suspended kitchen hood exhaust fan	SRH	1.00
Suspended Indoor Heat Pump Air Handlers	2S	0.25
Floor mounted indoor heat pump air handlers	RD	0.30
Energy Recovery Ventilation	RD	0.50
Pad Mounted Makeup Air Unit	1N	0.08

END OF SECTION

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SECTION 23 05 53 - IDENTIFICATION FOR HVAC SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

1.02 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Marking and designation of equipment and HVAC systems.
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 05 00 – Common Work Results for HVAC
 - 3. Section 23 07 00 – HVAC Insulation
 - 4. Section 23 20 00 – HVAC Piping
 - 5. Section 23 70 00 – Central HVAC Equipment
 - 6. Section 23 80 00 – Decentralized HVAC Equipment
 - 7. Division 26 - Electrical

1.03 REFERENCED STANDARDS:

- A. General: The following standards or codes (latest edition) form a part of this specification to the extent indicated by the reference thereto.
- B. American National Standards Institute (ANSI):
 - 1. ANSI A13.1-2007 Scheme for Identification of Piping Systems
- C. American Society for Testing and Materials (ASTM):

ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM C 411	Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

- D. National Fire Protection Association (NFPA):

Standard 255	Method of Test of Surface Burning Characteristics of Building Materials

E. Underwriters Laboratories, Inc. (UL)

Standard 723	Tests for Surface Burning Characteristics of Building Materials

PART 2 PRODUCTS

2.01 MATERIALS

A. Equipment Labels:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
9. Where used on outdoor equipment, minimum letter size shall be 3/4" and label shall include chemical and UV resistant finish suitable for exterior installation.
10. Label Content: Include equipment's Drawing designation or unique equipment number.

B. Decals for Thermostats and/or Space Temperature Sensors:

1. Provide each thermostat and/or space temperature sensor with a self-adhesive identification decal identifying the heating/cooling unit, etc. the designated sensor or thermostat controls, based on the unit tags listed in the schedules and indicated on the plans. Decal shall be 1/2 inch high with length to suit required content, clear background with 1/4 inch tall black lettering for the unit designation. Where installed in finished non-utility spaces, the decal shall be installed on bottom on the sensor/thermostat except where this would prohibit airflow or operation in which case the side shall be used.

C. Duct Labels

1. Material: Color coded permanent adhesive vinyl.
2. Letter Color:

- a. Supply Air: White
 - b. Return Air: White
 - c. Exhaust Air: Black
 - d. Outside Air: White
3. Background Color:
- a. Supply Air: Blue
 - b. Return Air: Green
 - c. Exhaust Air: Green
 - d. Outside Air: Blue
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: 2-1/4 inch high with length to suit required label content.
6. Minimum Letter Size: Minimum 1-1/2 inch high.
7. Direction of flow arrow: Arrow size minimum 2 inches high by 5 inches long.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
9. Label Content: Include equipment's Drawing designation or unique equipment number.
(example: AHU-1 SUPPLY AIR)

D. Piping Labels

- 1. Material: Pre-printed, color-coded, with lettering indicating service, and showing flow direction. Lettering shall be sub-surface printed and protected from direct contact by a layer of plastic.
- 2. Letter Color:
 - a. Refrigerant Piping: Black
 - b. Condensate Drain Piping: White
- 3. Background Color:
 - a. Refrigerant Piping: Yellow
 - b. Condensate Drain Piping: Green
- 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- 5. Minimum Label Size and letter height:
 - a. 3/4" to 1-1/4" outside diameter of pipe or covering:

- 1) 5-inch long, 1/2" letters
- b. 1-1/2" to 2" outside diameter of pipe or covering:
 - 1) 8-inch long, 3/4" letters
- c. 2-1/2" to 6" outside diameter of pipe or covering:
 - 1) 12-inch long, 1-1/4" letters
6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
7. Label Content: Include system service designation to match plans.

PART 3 EXECUTION

3.01 IDENTIFICATION OF PIPES, DUCTWORK AND EQUIPMENT

- A. Equipment: After other work is completed, each major item of equipment shall be properly identified with nameplates. Identification symbols and designations shall be the same as shown on the Contract Documents.
- B. Ductwork: Provide ductwork labels where ductwork is concealed and at the mechanical platform. Ductwork above concealed ceilings of rooms less than 250 SF do not require identification labels. Ductwork concealed in soffits do not require identification.
 1. Where ducts enter into and exit from concealed spaces.
 2. At access doors and similar access points into ductwork.
 3. Near major equipment items and other points of origination and termination.
- C. Apply piping system markers after completion of required insulation and finishes on piping systems. Markers shall be applied in the following locations and where identified by the Engineer:
 1. At each side of a pipe passage through floors, walls and partitions.
 2. Every 15 feet on straight runs of piping mains and branches.
 3. Apply all piping system markers where view is unobstructed, and legends can be read and easily identified.
 4. Apply piping system markers in accordance with the supplier's instructions.
 5. Self-adhering identification labels shall have plastic tape wrapped around each end. The tape shall overlap itself a minimum of 1/2 circumference.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Cleaning
 - 2. Testing
 - 3. Adjusting and Balancing
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 05 00 – Common Work Results for HVAC
 - 3. Section 23 07 00 – HVAC Insulation
 - 4. Section 23 20 00 – HVAC Piping
 - 5. Section 23 30 00 – HVAC Air Distribution
 - 6. Section 23 70 00 – Central HVAC Equipment
 - 7. Section 23 80 00 – Decentralized HVAC Equipment

1.02 REFERENCES

- A. General: The following publications listed below, form a part of this specification to the extent indicated by the reference thereto.
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
 - 1. Balancing and Adjustment Manual
- C. Associated Air Balancing Council (AABC):
 - 1. National Standards for Total System Balance
- D. National Environmental Balancing Bureau (NEBB):
 - 1. Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.03 QUALIFICATIONS

- A. For the air conditioning, heating and ventilation systems the Contractor shall obtain the services of a qualified, independent testing organization specializing in total system air testing and balancing. The Contractor shall be responsible for making changes motor speeds and dampers

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where necessary to obtain the required air volume as determined by the Testing, Adjusting and Balancing Contractor. The Testing, Adjusting and Balancing Contractor shall provide all labor, engineering and test equipment required to adjust, testing, adjusting and balancing all heating, ventilating, air conditioning and exhaust systems as hereinafter specified. All personnel involved in the execution of the work under the balancing contract shall be experienced and factory trained specifically in the total balancing of mechanical systems, as well as being regular employees of the Balancing Contractor. The Testing, adjusting and balancing Contractor shall work in close coordination with the Controls Contractor to ensure that the system is operating as designed and to aid in adjusting setpoints as necessary for proper system operation.

1.04 TAB COORDINATION AND RESPONSIBILITIES

A. The TAB Agent shall provide the following:

1. All instrumentation used in the course of testing and balancing shall be accurate and calibrated.
2. The TAB Agent shall conduct a pre-TAB inspection two weeks prior to commencing the testing, adjusting and balancing. The TAB Agent shall notify the Contractor in writing of any deficiencies that would affect the ability to successfully complete the testing, adjusting and balancing or result in an incomplete or unacceptable report.
3. During the course of the testing, adjusting and balancing, the TAB Agent shall immediately notify the Contractor of any equipment or system discrepancies discovered that need to be corrected prior to the satisfactory completion of the testing, adjusting and balancing procedures.
4. Equipment settings, including damper positions, valve positions, fan speed controls, and similar devices shall be marked to show final settings.

B. The Contractor shall provide the following:

1. Prior to the commencement of testing, adjusting and balancing, the installation of building systems shall be fully complete. Building controls systems shall be complete, operational, and verified by the Contractor.
2. The Contractor shall resolve any discrepancies noted by the TAB Agent in the Pre-TAB Inspection prior to commencing the testing, adjusting and balancing. The Contractor shall provide written confirmation of the corrective action that was taken to correct each deficiency.
3. The Contractor shall make available qualified personnel during the period in which the testing, adjusting and balancing is being conducted for the purpose of problem resolution and controls support.
4. The Contractor shall resolve any deficiencies noted by the TAB Agent prior to the submission of the report and prior to any subsequent visits required by the TAB Agent.

1.05 SUBMITTALS

- A. Prior to commencing work under this section, the Contractor shall submit the name of the testing organization, a proof of certification by the Associated Air Balance Council or National Environmental Balancing Bureau, and a list of five local projects on which testing and balancing has been completed within the previous two years, for approval by the Architect/Engineer. The submittal shall include TAB procedures proposed for the systems specific to this project.
- B. Heating, Air Conditioning and Ventilation Systems Balance and Performance Data: At a time no later than the Substantial Completion Inspection, the Contractor shall provide the Architect/Engineer with an electronic copy of schedules containing air system balance and performance data.
- C. Equipment and System Verification: Letters, signed by representatives of heat pump and air conditioning unit shall attest that their respective equipment installed on this project has been started, tested and set to operate safely and at the control points required as an integral part of the systems specified herein. The Contractor shall attest by letter that all equipment has been wired and tested to see that the indicated sequence of motor control is established, that all safety controls function properly, that all motor protective devices are sized correctly and that the systems are operating at the points set on the controls. The Engineers will not conduct a site visit for the purpose of determining the status of final payment until these letters are received.
- D. Test data shall be submitted for all equipment and systems where specifically required by this specification and all items identified with TD behind the product data.

1.06 CONDITIONS

- A. Partial Testing: As much as practical, systems shall be tested as complete systems. Tests on portions of a system will be permitted to facilitate proper progress scheduling. When systems are tested in segments, a system diagram indicating portion tested and a separate and complete report including the date of test is required for each segment.
- B. Concealed Work:
 - 1. All concealed work shall be tested and approved by the Architect/Engineer prior to the application of insulation or construction of chase walls.

PART 2 PRODUCTS

2.01 GENERAL

- A. All equipment, instruments, materials and utilities required for cleaning, testing and balancing of the air systems shall be provided by the Contractor.

2.02 INSTRUMENTATION

- A. All instruments used by this Contractor shall be accurately calibrated and maintained in good working condition.

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2.03 TESTS OF MATERIALS

- A. Manufacturers' certificates will be accepted in lieu of tests of materials. If individual laboratory tests are desired by the Architect-Engineer, they will be secured by this Contractor and paid for by the Owner.

PART 3 EXECUTION

3.01 CLEANING

- A. Equipment shall be wiped clean to remove all dust, oil, dirt or paint spots.
- B. Ductwork shall be thoroughly blown out or flushed and cleaned of all foreign matter before connections are made to equipment. After all construction dirt has been removed from the building, new filters shall be installed in all air units.

3.02 TESTING PROCEDURES

- A. Ductwork:
 - 1. Low Velocity Ductwork: Ducts, plenums and casings shall be tested and made substantially air tight at static pressure indicated for the system. Substantially air tight shall be construed to mean that no air leakage is noticeable through the sense of feeling or hearing.

3.03 ADJUSTING AND BALANCING

- A. Equipment: Before attempting to adjust and balance the air systems, the Contractor shall verify that the following items have been completed and are correct.
 - 1. Motor and bearings are properly lubricated.
 - 2. Direction of rotation of motors.
 - 3. Electric current flow in each phase of motors and electric heating elements.
 - 4. Motor protective devices are sized to properly protect installed motors.
 - 5. Thermostats, controls, accessories and other items requiring setting or adjustment shall be set as indicated.
- B. Air System Balancing Procedure:
 - 1. All airflow readings (such as outside, return, supply, exhaust, etc.) shall be determined from direct measurements (flowhood, duct traverse, etc.) Calculating an airflow based on the difference between other airflows and similar methods will not be accepted.
 - 2. Place all related supply, exhaust and return air systems in operation with the fans running at design RPM.
 - 3. Establish system conditions for the maximum demand in airflow; generally, a cooling application.

4. Measure supply, exhaust, return and outside air volumes by means of the duct traverse method, making a minimum of sixteen (16) readings. Test holes shall be in straight duct as far as possible downstream from elbows, takeoffs, dampers, etc. Seal duct access holes with metal snap-in plugs. The use of duct tape to seal access holes will not be permitted.
5. Adjust balancing dampers for required branch duct air quantities. Ducts with multiple branches shall have at least one branch with volume damper(s) completely open.
6. Adjust grilles and diffusers to within 10% of individual requirements specified, and also adjust so as to minimize drafts and sound in all areas. Restriction imposed by flow regulating devices in or at terminals shall be minimal. Final measurement of air quantity shall be made after optimum air pattern has been achieved.
7. The total air delivery in any particular fan system shall be obtained by adjustment of the particular fan speed. The drive motor of each fan shall not be loaded over the corrected full load amperage rating of the motor involved.
8. Adjust quantity of air on each zone to the values given in the specifications and/or plans.
9. If the supply fan volume is not within plus or minus 10% of the design capacity at design RPM, determine the reason by reviewing all system conditions, procedures and recorded data. Check and record the air pressure drop across filters, coils, eliminators, sound traps, etc., to see if excessive loss is occurring. Particularly study duct and casing conditions at the fan inlet and outlet.
10. Any changes that are required for the final balancing results will be provided for by the respective Contractors who supplied and installed such equipment under their contractual obligations. Such changes may encompass, but are not necessarily restricted to, the changing of pulleys, belts, dampers or adding dampers or access holes.

3.04 BALANCE AND PERFORMANCE DATA REPORT TD

- A. General: Each heating, ventilating and air conditioning system shall be operated and tested continuously for at least two consecutive days to verify that the system is operating satisfactorily and safely and that all equipment is producing the required capacity. To be successful, this test must be conducted with all controls in automatic position and all lights on or off to simulate day time or night time use of the building. Submit an electronic test and balancing report covering air system balance and performance. Reports must be received by the Architect-Engineer at least one week prior to the Contractor's request for a substantial completion inspection. Reports that contain deficiencies related to incomplete or improper system installation will be rejected by the Engineer without further review.
- B. Calibration Data: The report shall include a list of all instrumentation used and the date of the most recent calibration for each instrument.
- C. Balance Data: The following balance data shall be provided. Design and actual air flows shall be provided in tabular form.
 1. All Air Handling and Air Conditioning Equipment Used for Heating, Cooling and Ventilating (Split Systems, Energy Recovery Ventilator, and Makeup Air Unit):

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- a. System nomenclature and identification.
- b. Nameplate information: Manufacturer, model and serial number, horsepower, rpm, voltage, phase, maximum amperage.
- c. Fan speed.
- d. Static pressure profile – reading between all components and total external static pressure.
- e. Outside, return, and supply air quantities.
- f. Actual running motor amperage.

2. Fans

- a. System nomenclature and identification.
- b. Nameplate information: Manufacturer, model and serial number, horsepower, rpm, voltage, phase, maximum amperage.
- c. Fan speed.
- d. Total external static pressure.
- e. Air quantity.
- f. Actual running motor amperage.

3. Air Outlet and Inlet:

- a. Room identification.
- b. Manufacturer.
- c. Size.
- d. Free area factor.
- e. Air quantity.
- f. Velocity.

D. Performance Data: The following information shall be recorded twice each day and twice each night during the performance test. Reading shall be taken for each item at a different time each succeeding day at least two hours later than the time the reading was taken on the preceding day.

- 1. All Air Handling and Air Conditioning Equipment Used for Heating, Cooling and Ventilating (Split Systems, Energy Recovery Ventilator, and Makeup Air Unit):
 - a. System nomenclature and identification.
 - b. Nameplate information: Manufacturer, model and serial number.

- c. Dry bulb and wet bulb temperatures entering and leaving all coils.
- 2. Temperature: Each Room in Building. Temperature measurements shall be taken with the Contractor's calibrated equipment. Trended data from the temperature control system is not acceptable.
- E. Control Setting: During the performance and balance tests, control settings may require adjustment, and if so, shall be adjusted to produce the best balanced system operation. The final setting of each operating and safety control shall be recorded.

3.05 HVAC SYSTEM POST ACCEPTANCE TESTS

- A. Should completion of the building occur at such time that the required performance test must be conducted and test data recorded and submitted during a season when both heating and cooling system performance cannot be checked, the Contractor shall perform the tests and record all such data as is available with system operating automatically under the prevailing weather conditions. That part of the system portion which cannot be recorded because of the prevailing weather shall be delayed until the weather is appropriate at which time the remaining part of the required tests shall be conducted and data recorded accordingly. Portions of the tests may not be delayed without written consent of the Engineer.

END OF SECTION

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SECTION 23 07 00 - HVAC INSULATION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- B. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- C. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Piping Insulation
 - 2. Ductwork Insulation
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 05 00 – Common Work Results for HVAC
 - 3. Section 23 20 00 – HVAC Piping
 - 4. Section 23 30 00 – HVAC Air Distribution
 - 5. Section 23 70 00 – Central HVAC Equipment
 - 6. Section 23 80 00 – Decentralized HVAC Equipment

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Division 1 and Section 23 00 10.
- B. Submit shop drawings and catalog data for each type of material proposed for this project. Indicate thickness of material for individual services, and installation methods.

1.04 REFERENCES

- A. General: The following standards or codes (latest edition) form a part of this specification to the extent indicated by the reference thereto.
- B. American Society for Testing and Materials (ASTM):

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ASTM E84	Standard Test Method for Surface Burning Characteristics of Building materials.
ASTM C 411	Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

C. National Fire Protection Association (NFPA):

Standard 255	Method of Test of Surface Burning Characteristics of Building Materials

D. Underwriters Laboratories, Inc. (UL)

Standard 723	Tests for Surface Burning Characteristics of Building Materials

PART 2 PRODUCTS

2.01 GENERAL

A. Acceptable Manufacturers:

1. Manville, Owens Corning, Armstrong, IMCOA, Knauff or Certain-Teed except where specific manufacturer is named.

- B. All insulation materials, jackets and fitting covers shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E84, NFPA 255 and UL 723. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411.

2.02 MATERIALS

A. Piping:

1. Condensate Piping:

- a. Fine heavy density fibrous glass insulation with factory applied foil-scrim-white kraft paper vapor barrier jacket, molded to conform to piping, 0.24 btu•in./sq.ft./°F/hr. maximum "K" value at 75° F.
- b. Closed cell flexible elastomeric insulation, 0.28 btu•in./sq.ft./°F/hr. maximum "K" value at 75°F., maximum water vapor transmission rating of 0.1 perms-inch.

2. Refrigerant Piping: Closed cell flexible elastomeric insulation, 0.28 btu•in./sq.ft./°F/hr. maximum "K" value at 75°F., maximum water vapor transmission rating of 0.1 perms-inch. Insulation located outside the building shall have a selective finish to protect insulation from ultra violet (UV) solar radiation, unless specifically designed to withstand UV radiation.

B. Ductwork:

1. Exposed Rectangular Ducts: Rigid fibrous glass insulation, 3.0 lb. density, 0.24 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, with factory applied reinforced aluminum foil vapor barrier
 2. Round Ducts and Concealed Rectangular Ducts: Flexible fibrous glass insulation, 1.0 lb. density, 0.27 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, with factory applied reinforced aluminum foil vapor barrier.
 3. Acoustic Lining (where indicated and/or noted on Drawings): Fiberglass insulation, 0.26 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, absolute roughness of exposed surface shall not exceed 0.005 ft., coated to prevent erosion at air velocities up to 2000 fpm, 1.5 lbs/cu.ft. minimum density. Noise reduction co-efficient shall average not less than 0.60 when tested by Acoustical Material Association procedure mounting 6. Liner shall be provided with EPA approved biocide in the erosion coating to protect against microbial growth. Liner shall meet or exceed requirements of ASTM G21 (fungi resistance) and ASTM G22 (bacterial resistance). Acoustic lining shall be one inch thick unless specifically noted otherwise.
- C. Sealants, Mastics and Adhesives: Products either manufactured by or recommended by the insulation material manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not install insulation before piping, ductwork, and equipment have been tested and approved.
- B. Ensure surface is clean and dry prior to installation. Ensure insulation material is undamaged and dry before application. Finish with system at operating conditions and temperature.

3.02 INSTALLATION

- A. General: Ensure insulation is continuous through inside walls and partitions. Insulated piping passing through nonfireresistance rated floors shall be fireblocked. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope or approved equal. Finish insulation neatly at hangers, supports and other protrusions.
- B. Piping:
 1. General:
 - a. All pipe insulation (except refrigerant piping) shall be secured with outward clinching stainless steel staples and sealer.
 - b. Fittings and valves shall be insulated and jacketed with the same material as the adjacent piping or it may be finished with a smooth coat of approved insulating cement and jacketed with an approved recovering cloth and vapor sealed. Where PVC fitting covers are used, insulation shall be wrapped tightly using sufficient quantities to prevent deformation of covers.

- c. Mitering of straight pipe insulation to form elbows will not be acceptable or allowed.
 - d. All jacket joints and seams shall be lapped not less than 2".
 - e. Pipe hangers shall be oversized to enclose pipe and insulation. Provide sheet metal saddle between hanger and insulated pipe. Pipe hanger insulation shall be as manufactured by Pipe Shields, Inc., Bergen-Power Pipe Supports, Inc., Rilco Mfg. Co., Inc. or Valued Engineered Products, Inc.
 - f. Elastomeric and other foam insulations shall be installed without stretching or compressing individual lengths.
2. Cold Piping:
- a. Insulation shall be terminated one inch each side of unions and flanges. Larger size removable sections of insulation shall be secured over the flange or union and lapped over the pipe insulation not less than 3" each side of pipe insulation termination point.
 - b. All joints, voids and punctures in jacket and all exposed edges of insulation material shall be vapor sealed.
3. Refrigerant Piping:
- a. Cover all valves and fittings with equivalent thickness of insulating material. All edges shall be tightly butted. Seal all joints vapor tight.
 - b. Insulation exposed to weather shall be covered with minimum 0.016 aluminum jacket with all joints sealed weather-tight.

C. Ductwork:

1. External:
- a. Rigid duct insulation shall be secured to rectangular ducts with mechanical fasteners such as metal stick clips or cupped head weld pins located a maximum of 3" from each edge and spaced a maximum of 12" on center each way. All insulation joints shall be tightly butted. All joints, voids and punctures in facing shall be sealed vapor tight with pressure sensitive foil tape or mastic.
 - b. Flexible duct insulation shall be provided with a minimum 2" facing flap overlapping adjacent and connecting insulation. Seams shall be stapled approximately 6" on center with 1/2" outward clinching staples. Where rectangular ducts are 24" in width or greater, insulation shall be secured to the bottom of the duct with mechanical fasteners to prevent sagging. All insulation joints shall be tightly butted. All joints, voids and punctures in facing shall be sealed vapor tight with mastic.
2. Internal: The lining shall be applied to cut-to-size pieces fastened to the entire interior of the duct with mastic, stick clips and speed washers. Edges and joints shall be coated with fire resistant mastic. External duct insulation is not required on ducts with internal lining unless noted otherwise.

3. Ductwork exposed to outside conditions shall be insulated as specified herein and covered with minimum .025 inch thick aluminum jacket with seams lapped a minimum 3", sealed with silicon caulk. Covers shall be neatly finished and completely watertight.
4. See Section 23 30 00 for insulation on kitchen exhaust ducts.

3.03 INSULATION THICKNESS SCHEDULE

A. Piping:

Type	Size, Inches	Insulation Thickness, Inches
Refrigerant Suction	All	1
Refrigerant Liquid	All	1
HVAC Condensate Drain Piping	All	1/2

B. Ductwork:

Type	Insulation Thickness Inches, External
Outside Air Intake (between outside air louver and energy recovery ventilator)	3 (R-11 minimum)
Supply (Heating and Cooling)	1-5/8" (R-6)
Return within the building envelope	0, no insulation
Outside air and exhaust Plenums	3 (R-11 minimum)
Exhaust Air (between energy recovery ventilator and exhaust plenum/louver)	3 (R-11 minimum)
Supply, Return and Exhaust Exposed to Outside Air Conditions	3 (R-11 minimum)

END OF SECTION

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SECTION 23 20 00 - HVAC PIPING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2023.
- B. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.

1.02 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Pipe and Pipe Fittings
 - a. Miscellaneous Piping Specialties
- C. Related Sections:
 - a. Section 23 00 10 – HVAC General Requirements
 - b. Section 23 01 00 – Operation and Maintenance of HVAC Systems
 - c. Section 23 05 00 – Common Work Results for HVAC
 - d. Section 23 05 48 – Vibration Controls for HVAC Systems
 - e. Section 23 05 53 – Identification for HVAC Systems
 - f. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
 - g. Section 23 70 00 – Central HVAC Equipment
 - h. Section 23 80 00 – Decentralized HVAC Equipment

1.03 REFERENCES

- A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.
- B. American Society for Testing and Materials (ASTM):
 - 1. B42-15a Standard Specification for Seamless Copper Pipe, Standard Sizes
 - 2. B75 / B75M-11 Standard Specification for Seamless Copper Tube
- C. National Electrical Manufacturers Association (NEMA)
- D. Underwriters Laboratories, Inc. (UL)

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1.04 SUBMITTALS

- A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.
- B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.
- C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 00 10.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Material Standards:
 - 1. Copper ACR tubing shall be manufactured in accordance with ASTM B280 and shall be so labeled.
 - 2. PVC Schedule 40 shall be manufactured in accordance with ASTM D2665 and shall be so labeled.
- B. Cooling coil condensate drain lines shall be PVC, Schedule 40, DWV. Fittings shall match the piping.
- C. Refrigerant piping shall be type "ACR" hard drawn copper tubing, factory cleaned, dehydrated and capped with wrought copper fittings. Provide all accessories recommended by the manufacturer. Prior to offering the system for final acceptance, the Contractor shall submit a written certification from an authorized official of the equipment manufacturer stating the complete system, to include refrigerant piping, has been installed in accordance with the manufacturer's recommendations.
 - a. Due to length and routing of refrigerant piping, preinsulated linesets is not acceptable.

2.02 MISCELLANEOUS PIPING SPECIALTIES

- A. Water seals (Trap) shall be provided on condensate drain from each air handling unit. Seal shall be of sufficient depth to prevent blowout or siphoning of water and shall be configured as indicated on the Drawings.
- B. Pipe sleeves shall be installed as outlined in Section 23 00 10 HVAC General Requirements.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

- A. General: Sleeves and sealant shall be provided where pipes pass through floors, partitions or walls as outlined in Section 23 00 10, HVAC General Requirements. Pipe shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all openings. Piping installation shall be concealed in finished areas shall be concealed. Excessive cutting or other weakening of the building structure to facilitate

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piping installation will not be permitted. Each end of each piece of pipe shall be reamed. Pipe shall be installed to permit free expansion and contraction without damage to joints or hangers. Changes in direction shall be made with fittings, except that bending of refrigerant piping will be permitted provided a hydraulic or mechanical bender is used, wide sweep bends are formed, and the bends are compliant with manufacturer recommendation. When bending will not work refrigerant piping, fittings shall be used and are preferred.

- B. Cooling coil condensate drain lines shall slope 1/8" per foot in direction of flow.
- C. Piping connections to equipment shall be provided with unions or flanges.
- D. Open ends of pipe lines or equipment shall be properly capped or plugged during installation to keep dirt or foreign material out of the system.
- E. Miscellaneous piping terminating at floor drains or in the air shall be resiliently anchored to protect against fatigue or damage incurred as a result of vibration or abuse.
- F. Underground Steam Piping Systems shall have conduit systems tested in addition to carrier piping, as indicated in Section 23 05 93.

3.02 REFRIGERANT PIPING

- A. All refrigerant piping shall be sized, installed, and routed in accordance with the refrigeration equipment manufacturer's recommendations.
- B. All piping joints and the inside of all piping shall be clean. Burnish all mating surfaces until all dirt, oxide, or other debris is removed. Using no flux, braze all joints using hard solder equal to Stay-Bright for pipe 2 inches and below or Stay-Silver for pipe larger than 2 inches. Remove all internal components from refrigerant accessories which may be subject to heat damage prior to brazing.
- C. Before charging, refrigerant lines shall be thoroughly cleaned and purged. Refrigerant lines shall be pulled down to a vacuum of 400 microns or better as recommended by manufacturer and then pressure tested according to the manufacturer's instructions before charging with refrigerant.

END OF SECTION

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SECTION 23 30 00 - HVAC AIR DISTRIBUTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- C. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.
- D. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- E. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.
- F. VUSBC - Virginia Uniform Statewide Building Code; current.

1.02 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. HVAC Ductwork
 - 2. Air Duct Accessories
 - 3. HVAC Fans
 - 4. Air Outlets and Inlets
 - 5. Wall Louvers
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 01 00 – Operation and Maintenance of HVAC Systems
 - 3. Section 23 05 00 – Common Work Results for HVAC
 - 4. Section 23 05 48 – Vibration Controls for HVAC Systems
 - 5. Section 23 05 53 – Identification for HVAC Systems
 - 6. Section 23 07 00 – HVAC Insulation

7. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
8. Section 23 70 00 – Central HVAC Equipment
9. Section 23 80 00 – Decentralized HVAC Equipment

1.03 REFERENCES

- A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.
- B. Air Movement and Comfort Association (AMCA):
 1. Bulletin 210, Standard Test Code for Air Moving Devices
 2. Standard 511, Air Performance and Water Penetration
- C. American Society for Testing and Materials (ASTM):

ASTM A 653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM E84-15b	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM C 411	Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

- D. Underwriters Laboratories, Inc. (UL)

Standard 723	Tests for Surface Burning Characteristics of Building Materials

- E. Sheet Metal and Air Conditioning Contractors' Association (SMACNA)
 1. Duct Construction Standards (Latest Edition)
- F. National Fire Protection Association (NFPA):
 1. Standard 90A – Standard for the Installation of Air Conditioning and Ventilating Systems
 2. Standard 90B – Standard for the installation of Warm Air Heating and Air Conditioning Systems

1.04 DEFINITIONS:

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- A. Duct Sizes: Sizes shown on Drawings are inside airflow dimensions. Where ductwork is internally lined or double-wall ductwork, the contractor shall provide the outside sheet metal dimension that provides the airflow dimension indicated on the plans.
- B. Low Pressure Ductwork: Static pressure rating less than 2" w.g. and velocities less than 2000 fpm.

1.05 SUBMITTALS

- A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.
- B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.
- C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.
- D. All fans for use with Variable Frequency Drives (VFD) shall have critical speed and multiples of critical speed indicated on each submittal.

PART 2 PRODUCTS

2.01 HVAC DUCTWORK

- A. Materials:
 - 1. Sheet Metal Ducts and Duct Fittings: Trademarked galvanized steel, lock forming quality, having zinc coating of 0.90 ounces per square foot for each side (G90, ASTM A 653 and A 924).
 - 2. Fasteners: Use rivets and bolts throughout; sheet metal screws may be used on low pressure ducts.
 - 3. Sealants: Water and fire resistant when dry, compatible with mating materials. Where sealants are used on exposed ductwork, composition shall be designed to prevent bleed-through of finish paint, or sealant shall be pre-painted with a coating impervious to bleed-through. For field applications within the weatherproofing system, all adhesives and sealants shall comply with the requirements of the California Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.
 - 4. All duct and accessory materials shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E84-15b, NFPA 255 and UL 723. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411.
- B. Fabrication:
 - 1. All ductwork shall conform accurately to the dimensions indicated on plans and shall be fabricated and installed in accordance with ASHRAE Guide and Data Books and

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SMACNA Duct Construction Standards, except that sheet metal gauges and zinc coating shall not be lighter than specified under this Section.

2. All rectangular sheet metal ducts over 18" wide shall be cross-broken for rigidity.
3. Reinforcing angles, stiffeners and tie-rods for all sheet metal ducts shall be provided where required to prevent sagging, buckling, and vibration in accordance with the latest SMACNA Duct Construction Standards Publication. Reinforcing for flat oval duct shall be provided as specified for rectangular duct in accordance with the latest SMACNA Duct Construction Standards Publication.
4. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth interior surface.
5. Where square elbows are indicated on the Drawings, curved elbows may be used provided the centerline radius is not less than 1-1/2 times the width of duct and as space allows.
6. Provide turning vanes in all square elbows. Provide air foil type turning vanes on all ducts more than 24" wide.
7. Transitions shall be made with a slope ratio of 4:1, except at equipment divergence and convergence shall not exceed a slope ratio of 3:1.
8. All duct joints and seams shall be mechanically tight, and sealed with sealant or gaskets to provide a substantially airtight system.
9. All duct liners shall be installed using fasteners in strict accordance with SMACNA Duct Construction Standards. Fastener pins shall be clinched pin type or welded pin type. The use of adhesive type pins is not acceptable. All liners shall have transverse edges coated with adhesive, all corners lapped and butted or folded.
10. Duct liners at fan discharges shall be lapped on outside of fan discharge flange or shall have metal nosing on leading edge. Fastening pin length shall be equal to liner thickness.
11. Provide easements where low pressure ductwork conflicts with piping and structure. Where easement exceeds 10% duct area, split into two ducts maintaining original duct area.

C. Low Pressure Ducts:

1. Sheet Metal Gauges:

a. Rectangular Ducts:

Max. Dimension., In.	Min. Gauge
Up to 30	24
31 to 54	22
55 to 84	20

b. Round Ducts:

Duct Diameter, In.	Min. Gauge
Up to 22	24
23 to 36	22
61 to 84	16

D. Spiral Duct

1. Sheet Metal Gauges

a. Round Ducts (Factory Made With Spiral Lock Seams equal to United McGill):

Duct Diameter, In.	Min. Gauge
Up to 26	24

E. Special Ducts S

1. Kitchen exhaust ducts carrying grease laden air shall comply with one of the two systems listed below.

- a. Field fabricated ductwork shall be constructed from 16 gauge black sheet steel with all joints, seams and penetrations welded liquidtight. Mechanical fasteners shall not be used for assembly or support where such fasteners could penetrate the duct walls. Ducts shall run continuous from the hood connection to the exhaust fan connection and from the exhaust fan to exhaust plenum and louver. Access doors shall be provided in the side of each horizontal section of duct and within the plenum for cleaning purposes. Access doors shall be a minimum of 12 inches or shall be the full width of the duct and shall be located at a maximum spacing of 20 feet. The exhaust duct shall be insulated with 2" thick calcium silicate blocks from the ceiling above the hood to the exhaust louver at the exterior of the building, including the ductwork and plenum. Insulation shall be held away from the duct at least one inch and anchored with angles, welded studs or clips. Insulation shall be secured with No. 12 gauge annealed wire not over 12" on center. Finish with insulating cement troweled on in a 1/2" thick coat over chicken wire. The entire insulated duct assembly shall be encased in a 22 gauge galvanized sheet metal jacket. At the Contractor's option, or in installations requiring fire rated assemblies, insulation shall be Super Firetemp fireproofing board as manufactured by Johns Manville or equal. Thickness and type shall be type L (one hour rating) or type M (two hour rating) as required by the VUSBC. Insulation shall be installed in strict accordance with manufacturer's instructions. Fire resistant duct wrap is not acceptable.
- b. Factory fabricated, double wall, insulated grease duct S as manufactured by Metal-Fab, Metalbestos, or Hart & Cooley. Duct shall be suitable for 0" clearance to combustibles. Duct shall consist of minimum 0.035" thick stainless steel inner wall, minimum 0.024" aluminized steel outer wall, and high temperature ceramic insulation. Duct shall be UL listed and shall comply with NFPA 96. Duct system shall be one or two hour rated as required by VUSBC. Grease duct system shall include all supports, fittings, roof penetrations, expansion joints, etc. as necessary for a full and proper installation. Grease duct shall be installed in strict accordance with manufacturer's instructions.
- c. Shop drawing shall include a sketch showing the assembly of all sections.

2. All exposed round ductwork shall be double-walled internally insulated duct with perforated internal liner, 1" acoustic insulation and paint grip coating on exterior. Provide all fittings and adapters to match lined duct. Couplings shall be used for duct connections, duct flanges shall not be allowed. Insulation shall have K factor of 0.27 btu/hr./sq.ft./in./°F at 75°F mean temperature and minimum noise attenuation of 1.54 dB/ft. at a center frequency of 1000 Hz and 2000 fpm in 24" diameter duct. Ductwork shall be United McGill Acousti-K27 or approved equal. Joint mastic shall be totally concealed within fitting couplings.
- F. Flexible Round Ducts S: Flexible Round Ducts shall be Flexmaster Type 8M or Thermaflex type M-KE. Duct shall incorporate acoustic rated CPE inner liner, 1" thick fiberglass insulation, and reinforced metalized vapor barrier. Maximum C factor shall be 0.24 btu/hr./sq.ft./°F at 75°F mean temperature. Duct shall have a working pressure of not less than 6 inches w.g. for positive pressure and 1 inch w.g. for negative pressure and suitable for velocities up to 4000 fpm. Vapor transmission shall be less than 0.05 Perm when tested in accordance with ASTM E96, Procedure A. The entire assembly shall be rated and marked as UL 181 Class 1. Flame Spread Rating shall not exceed 25 and Smoke Developed Rating shall not exceed 50 when tested in accordance with ASTM E84-15b, NFPA 255, and UL 723. Minimum duct insertion loss at 2500 fpm for a 10-foot length of straight duct shall be as listed below when tested in accordance with ADC FD-72 R1.

DUCT INSERTION LOSS, DB

Octave Band	2	3	4	5	6
Frequency, Hz	125	250	500	1000	2000
6 inch duct	7	19	34	37	38
8 inch duct	8	13	29	35	36
12 inch duct	20	26	27	33	26

3.01 AIR DUCT ACCESSORIES

A. Dampers:

1. Manual Volume Dampers:

- a. Low Pressure Round: Where included as part of a round duct takeoff, MVD shall be integrated into the HETO takeoff specified below. Where not integrated into the HETO takeoff, MVD shall include minimum 3/8" solid rod, 20 gauge frame and 20 gauge single butterfly blade. Basis of design is Ruskin MDRS25.
- b. Low pressure rectangular (minimum 6"x4" up to maximum 12"x12"): MVD shall include minimum 3/8" solid rod, 20 gauge frame and 20 gauge single galvanized blade with center V groove for reinforcement. Basis of design is Ruskin MD25.
- c. Low pressure rectangular (above 12" width or 12" height up to maximum 48"x48"): MVD shall include 5" wide 16 gauge galvanized steel channel with corner braced frame. Blades shall be 8" maximum width 16 gauge galvanized steel with opposed blade operation. MVD shall include: 1/2" solid hex shaped damper axle, damper

linkage concealed in frame and molded synthetic bearings. Basis of design is Ruskin MD35.

- d. Where traditional access to a manual volume damper is not achievable through an accessible ceiling or similar, provide the MVD with a cable operated damper operable through the face of the diffuser.

- 1) Remote Operated Volume Dampers S: Furnish and install, at locations shown on plans or as in accordance with schedules, remote control operated zone control dampers meeting the following specifications. Material and construction specifications shall be minimum equivalent to Ruskin Model ZPD15 for rectangular applications and ZPD25 for round applications.

- (a) Dampers shall be of the butterfly type, consisting of a circular blade, fastened to a continuous 3/8" mild steel square shaft.
- (b) Inside frame surface shall be clean and smooth with no blade stops or similar inward projections that increase pressure drop.
- (c) Frame shall be minimum 20 gage G60 galvanized steel and include full circumference rolled stiffener beads to allow easy sealing of spiral or flexible round duct joints.
- (d) Blade shall be of the same material as the frame. Bearing shall be molded lexan, and shall be formed to the shape of the axle, reducing leakage around shaft penetration points.
- (e) A 9-volt DC operated damper motor shall be factory installed and commissioned prior to shipping to the job site. Actuator shall include a factory wired RJ11 connector.
- (f) Damper shall be installed with plenum rated RJ11 cable terminating at the RJ11 damper motor connector on one end and an RJ11 connector located in a wall box or diffuser on the other end.
- (g) The damper assembly shall be powered by a remote 9-volt battery operated controller that is plugged into the RJ11 connector located in the wall box or diffuser.

- B. Round branch take-off connections from mains shall be made using Tapered High Efficiency Takeoff (HETO) with 45° low loss entry, minimum 24 gauge, made of G-90 galvanized steel. HETO shall come standard with sealed joints and riveted seam on collar and boot. Takeoff shall include pre-sealed gasket made of EPDM rubber. Takeoff shall include integrated manual volume damper except where space/routing will not allow integrated damper, in which case an in-duct round manual volume damper shall be provided as specified above. Manual volume damper shall include minimum 3/8" solid rod and 22 gauge blade. Damper quadrant operator shall be installed on 2" high 4 bend galvanized steel bracket so that duct insulation may be extended and sealed under the quadrant operator and locking quadrant. End of damper rod on each damper shall be grooved to show damper position.

- C. Rectangular branch take-off connections from mains shall be made using 45 degree entry fittings per SMACNA Duct Construction Standards, latest edition. Grille and register connections to mains shall be made using 45 degree entry fittings where space allows. Where diffuser, register or grille is located too close to the main, air deflectors shall be used. Air deflectors shall be factory fabricated. Adjustable deflectors shall be complete with worm gear operator when behind grilles, an extension rod and concealed regulator when above plaster ceilings, or self-locking lever type regulator when accessible.
- D. Instrument Test Holes: Holes, with patches, in ducts and plenums shall be provided where directed or necessary for using pitot tubes for taking air measurements for balancing the air systems. At locations where ducts or plenums are insulated and on all medium and high pressure ductwork die cast collars with threaded neoprene caps shall be provided.
- E. Apparatus Connections: At points where sheet metal connections are made to fans or where ducts of dissimilar metal are connected, provide a flexible connection of neoprene coated canvas of sufficient length to eliminate transmission of vibration. Flexible connections shall be securely fastened and air tight.
- F. Duct Sleeves: All ducts shall have sleeved openings 1" larger than the overall duct dimensions framed in place when the wall is constructed and 1/4" larger when floors are poured. Space between duct or duct insulation and sleeve shall be tightly filled with mineral fiber rope insulation and sealed or equal.
- G. All wire mesh, woven metal fabric, bird screens, and similar items shall be constructed from corrosion resistant, galvanized steel or aluminum.
- H. Acoustic Lining: See Section 23 07 00.

3.02 HVAC FANS S

- A. Kitchen Hood Exhaust Fan (EF-KH):
 - 1. Kitchen grease hood exhaust fan shall be equal to Greenheck model QEI-18 or approved equal horizontal mixed flow type, suspended mounted, substantially constructed of heavy gauge steel casing. Fan shall have angled and contoured blades, access doors, adjustable V-belt drive, motor and belt guard. Casing of the unit shall be of heavy gauge, rust protected steel, welded, and provided with easily removable access panels located on the side of the unit. Fans shall be inline type with each fan in a separate scroll. Fans shall be statically and dynamically balanced, after unit assembly, at the factory. Fans shall be mounted on steel shaft, ground and polished, and supported in ball type bearings provided with lubrication facilities outside the unit. Fans and scrolls shall be furnished with an approved rust inhibitor treatment. Fans shall be driven by a unit mounted motor connected to fans by V-belt drive complete with belt guard. Belt drives shall be designed for not less than 150% of the connected motor capacity, and sheaves shall be adjustable to provide not less than 20% speed variation. Sheaves shall be selected to drive the fan at such speed to produce the specified capacity when set at its approximate midpoint. Fan shall UL 762 listed for grease removal and shall have a non-sparking wheel. Interlock fan operation to kitchen exhaust control panel as required.

3.03 AIR OUTLETS AND INLETS S

- 1) Acceptable Manufacturers:
 2. Standard Products: Krueger, Metal Industries, Tuttle and Bailey, Titus and Price.
- B. General:
 1. All devices shall be commercial grade and shall be constructed of aluminum.
 2. Manufacturer shall certify cataloged performance and ensure correct application of each air device to provide air pattern, velocity, pressure drop and sound characteristics NC suitable for space installed. Shop drawings shall include air quantity, size, pressure drop, throw ft, and sound level NC.
 3. All devices located in ceilings shall have white baked enamel finish or as indicated in the Air Distribution Terminal Devices schedule on sheet M6.01.
 4. Maximum air outlet noise level shall not exceed NC35.
- C. Grilles, Registers & Diffusers:
 1. GRD's shall include 2x2 and 1x1 ceiling plaque diffusers, fixed blade grilles and registers, linear slot diffusers and curved frame in duct mounted double deflection supply registers. Refer to the Air Distribution Terminal Devices schedule on sheet M6.01 for mounting, model and related GRD product information.

3.04 WALL LOUVERS S

- A. Standard environmental louvers (IL-1 & EL-1) shall be equal to Greenheck model ESD-435 or approved equal. Refer to louver schedule on sheet M6.01 for size and performance data. Louvers shall be stationary, stormproof units constructed of 16 gauge aluminum, 0.081" extruded aluminum complete with 1/2" mesh matching bird screen in removable frame and extended sill. Blades shall be "S" shape spaced 3 1/4" - 4" O.C. Finish shall be anodized, color as selected by Architect (provide color chart with submittal). Pressure drop shall not exceed 0.05 inch H2O at scheduled velocity and water penetration shall not exceed 0.01 oz./sq. ft. at 500 fpm when tested in accordance with AMCA Standard 511, and shall be licensed to bear the AMCA seal.
- B. Kitchen exhaust louver (EL-2) shall be a heavy duty louver constructed on 304 stainless steel with stationary blade spacing of 3-1/4" minim to maximum of 4". Provide louver with stainless steel piano hinge on one side, stainless steel latch on other side to allow for louver to be field opening to facilitate louver and kitchen exhaust and plenum cleaning. Refer to louver schedule on sheet M6.01 for proposed size. Pressure drop shall not exceed 0.1.0 inch H2O at scheduled velocity and minimum free area shall be 4.0 square feet. The louver shall not include a screen, dampers, or other obstructions/protrusions that enable the collection of grease.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Duct clearance and lengths shall be established from measurements taken at the job site before any ducts are fabricated.
- B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing and balancing of system.
- C. Locate ducts with sufficient space around equipment to allow normal passage, and operating and maintenance activity.
- D. Locate all ductwork to align with the ceiling grid where connections are to be made to Diffusers, Registers and Grilles. Field verify exact grid location before installing ductwork.
- E. Locate all Diffusers, Registers and Grilles as indicated on plans and in accordance with the Reflected Ceiling Plans, if provided.
- F. Provide low loss factory fabricated fittings for all round take-off connections to low velocity rectangular ducts.
- G. All Flexible round duct shall be properly supported to prevent any short radius bends or kinks. Connections to diffusers shall be made using long radius bends or elbows with turning vanes to ensure that airflow is distributed evenly across the neck of the diffuser. Conditions that create higher airflows in one quadrant of diffuser throw are not acceptable. Maximum flexible round duct runout length shall be 5 feet. Flexible round duct shall not penetrate wall construction of any type.
- H. Install duct accessory items in accordance with manufacturers printed instructions.
- I. Install volume dampers where shown on plans.
- J. Grille, Register and Diffuser Installation:
 - 1. Boots to diffusers shall fit airtight to diffuser necks and diffusers shall be securely fastened thereto.
 - 2. Where grilles are installed at walls or ceilings, the duct shall be fastened securely to the panel at each side of the opening and the grille shall be securely fastened snug against the panel.
 - 3. Ceiling diffusers shall be installed in and coordinated with the ceiling tile or other ceiling units. Diffusers, Registers and Grilles shall be centered in each ceiling unit, unless shown otherwise. Mounting frames shall be installed as required to support diffusers, registers and grilles. Grilles, registers and diffusers shall not be supported from the ceiling system, conduit, piping or unrelated ductwork.
- K. Provide access doors at all points requiring inspection or servicing. Duct access doors for grease duct cleaning shall be permanently labeled with minimum 1/2 inch high letters reading GREASE DUCT ACCESS.

- L. All grease exhaust ductwork shall be sloped downward to the hood or an approved receptacle at not less than 1/4 inch per foot.
- M. Wall louvers shall be installed leveled, aligned with building elements where applicable. Coordinate exact location and elevation with the architect and structural elements.

END OF SECTION

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SECTION 23 70 00 - CENTRAL HVAC EQUIPMENT

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

1.02 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Makeup Air Handling Unit
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 01 00 – Operation and Maintenance of HVAC Systems
 - 3. Section 23 05 00 – Common Work Results for HVAC
 - 4. Section 23 05 48 – Vibration Controls for HVAC Systems
 - 5. Section 23 05 53 – Identification for HVAC Systems
 - 6. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
 - 7. Section 23 20 00 – HVAC Piping
 - 8. Section 23 30 00 – HVAC Air Distribution

1.03 REFERENCES

- A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.
- B. Air Moving and Conditioning Association, Inc. (AMCA):

Bulletin 210	Standard Test Code for Air Moving Devices

- C. Air Conditioning and Refrigeration Institute (ARI):

Standard 210	Standard for Unitary Air Conditioning Equipment
Standard 410	Standard for Forced Circulation Air Cooling and Heating Coils

Standard 430	Standard for Central Station Air Handling Units

D. American National Standards Institute (ANSI):

Standard B31.1	Code for Pressure Piping

E. American Society of Heating, Refrigeration and Air Conditioning Engineers (ANSI/ASHRAE):

Standard 15	Safety Code for Mechanical Refrigeration

F. National Fire Protection Association (NFPA):

Standard 30	Flammable and Combustible Liquids Code
Standard 90A	Air Conditioning and Ventilating Systems of other than Residence Type

G. National Electrical Manufacturers Association (NEMA)

H. Sheet Metal and Air Conditioning Contractors' Association (SMACNA)

1. Duct Construction Standards (Latest Edition)

I. International Fuel Gas Code

J. Underwriters Laboratories, Inc. (UL)

1.04 EQUIPMENT LABEL

A. All mechanical equipment and appliances shall be listed and labeled by a nationally recognized testing and inspection agency approved by the authority having jurisdiction. All equipment and appliances shall be installed in accordance with the conditions of the listing. Manufacturer's installation instructions shall be available at the job site at the time of inspection.

1.05 SUBMITTALS

- A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.
- B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.
- C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

PART 2 PRODUCTS

2.01 MAKEUP AIR HANDLING UNIT (MAU-1) S

A. General: Unit shall be manufactured by Captive Aire, model CAS-HVAC3-I.400-24MF-30T or approved equal. Unit performance shall match equipment schedule provided on sheet M6.01.

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- B. Casing: Shall be constructed of minimum 20 gauge G-90 galvanized steel riveted together via structural pop-rivets. All metal shall be CNC bent for precise assembly. All metal shall be CNC bent for precise assembly. Entire interior and exterior casing shall be constructed of minimum G90 galvanized steel. The unit casing will not be painted. Unit shall have undergone a salt spray corrosion test as per ASTM B117.
1. Rigging Provisions: Unit shall have a structural base constructed of minimum 14 gauge G-90 galvanized steel. Include full-sized fork pockets and lifting points on all four sides. Include full-sized fork pockets and lifting points on all four sides.
 2. Roof Construction: The lids shall be fabricated by forming a double-standing, self-locking seam that requires no additional support. Unit roof shall be pitched to allow for proper drainage.
 3. Exterior Wall Construction: All exterior walls shall consist of a double wall, G-90 galvanized steel construction. Unit shall be insulated with 2in. thick, R13 closed cell foam.
 4. Service Access Doors: All door jambs shall be gasketed around their perimeter, and allow for doors to be mounted via removable, spring actuated, stainless steel hinges with stainless steel rivets, and self-compressing latches. Each compartment shall have removable access panels to allow for ease of service and maintainability. Electrical cabinet access doors shall have a door hold installed to prop doors open. All doors shall have stainless steel latches which are pad lockable. Electrical cabinet doors shall be outfitted with schematic/manual pouches formed into the door, along with wiring diagram attached to the indoor of the door from the factory.
- C. Airflow Configuration:
1. Discharge: Unit shall be configurable for Side (Horizontal) Discharge through the cabinet.
 2. Return: Unit shall be configurable for Side (Horizontal) Return through the cabinet.
 3. Unit intake airflow configuration shall be through use of a fresh/outdoor and return air damper.
 - a. Damper: Shall exceed AMCA Class 1A standard for low leakage. Damper assembly shall be a single assembly, and outfitted with an integral bird screen. Louver/gutter system used to divert any drainage through the unit's base – intake air hood not required.
 - b. Actuator: A single direct drive damper actuator shall be used with spring return to ensure that the outdoor air section closes when not powered.
- D. Supply Air Blower and Motor:
1. All supply fans shall be direct drive (belt-drive not acceptable) variable speed plenum fans.
 2. Blower Motor: Motor shall be a premium efficiency motor available as an Open Drip Proof (ODP) motor driven by a Variable Frequency Drive.
 3. Fans to be selected at or near efficiency peak. (Submit fan curves)

4. Blower and motor assembly shall be dynamically balanced. The entire blower and motor assembly shall be mounted on rubber vibration isolators. Wheels balanced as per AMCA 204-96, Balance Quality and Vibration Levels for fans.
5. Unit equipped with total CFM monitoring to measure airflow across supply discharge.

E. Refrigeration System:

1. Unit shall utilize a variable speed inverter duty scroll compressor with the following features:
 - a. Modulation: Compressor shall be capable of compressor speed modulation from 25%-100%.
 - b. Refrigerant: Unit shall be factory charged with R454B refrigerant.
 - c. Vibration Isolation: Compressor as well as blower assembly shall each be mounted on rubber vibration isolators to reduce transmission of vibration to the building structure.
 - d. Internal Overload Protection: Compressor shall include internal thermal overload protection to protect against excessive motor temperatures.
 - e. Crankcase Heater: Compressor shall include a crankcase heater to protect against liquid flood-back and elimination of oil foaming on startup. The crankcase heater must remain powered when the compressor is not in operation.
 - f. Oil Management: Unit shall utilize both passive and active oil return management using Oil Level Sensor and scheduled oil boosts.
 - g. Monitored Envelope: Unit shall monitor all critical refrigeration points to ensure compressor does not operate outside of safe operating envelope.
 - h. Throttling Logic: Unit shall allow for high head pressure monitoring throttle mode for high ambient operation, and low suction pressure throttle mode for low capacity operation or any conditions resulting in low suction pressure.
2. The unit shall be outfitted with the following:
 - a. Indoor Coil: Indoor coil shall be a high efficiency 7 row coil design with aluminum fins mechanically bonded to copper tubes. Coil is staggered to increase turbulence, reduce the coil bypass factor, and ultimately increase the time the air stays within the coil. Includes two probe sensors to read average coil face temperature.
 - b. Electronic Expansion Valve: Each refrigeration circuit will be outfitted with an electronic expansion valve metering device which can be throttled from 0-100% open to allow for precise superheat control.
 - c. Indoor Coil Drain Pan: The indoor coil shall be outfitted with a sloped stainless steel drain pan. This pan shall be insulated along the entire base to prevent condensation, and outfitted with a safety overflow switch which will automatically shut down cooling operation prior to water overflowing the drain pan in the event of a drain clog. The

entire drain pan shall be 20 GA Stainless Steel construction and wrap beneath the entire coil with flashing on entering side of coil to ensure capture of all condensate. Drain pan discharge pipe shall also be stainless steel construction. Drain pan shall be pitched to exceed ASHRAE 62.1 standard.

- d. Base of the condensing coil cabinet shall be pitched away from the unit as a safety to ensure all draining exits away from the curb.
 - e. Modulating Hot Gas Reheat Coil: The unit shall include copper tube and aluminum fin modulating hot gas reheat coil mounted downstream of the indoor coil. This coil shall be controlled via fully modulating hot gas reheat valve to provide precise reheat temperature control. This coil shall include the addition of an evaporative coil leaving condition sensor to maintain a coil dew point. This also prevents operation of a dehumidification call when intake dew point conditions are found to be below space dew point conditions, preventing wasted energy.
 - f. Outdoor (Condenser) Coil: Outdoor coil shall be a high efficiency coil design with aluminum fins mechanically bonded to copper tubes. The coil shall be downward sloped to protect coil from hail damage.
 - g. Outdoor Fans: The outdoor coil shall have a vertical discharge outfitted with quiet, efficient, fully modulating Electronically Commutated Motor (ECM) condensing fans. These fans shall modulate to maintain a temperature differential between outside air and the outdoor coil.
3. To help mitigate any long-term potential for leaks or hardware failures, the unit shall be outfitted with the following protection measures.
- a. Suction line accumulator for added protection against liquid entering suction line of compressor.
 - b. Bi-flow, low pressure drop, filter drier.
 - c. Electronic Expansion Valve (EEV) for precise superheat control. EEV shall open partially allowing system pressure equalization prior to activation of the compressor.
 - d. Protective rubber sleeves installed on all distribution lines of indoor coil to prevent wear from rubbing.
 - e. All refrigeration ports shall be short-stub assembly and any access port with a transducer or switch is mounted vertically to mitigate risk of bent/cracked stub joints.
 - f. Refrigeration circuit shall be mechanically CNC pre-bent tubing wherever possible with minimal brazed joints to minimize points for potential refrigeration leaks.
 - g. Factory tested for leaks via high pressure nitrogen decay and helium tracer gas testing.
 - h. Suction line temperature sensor failure detection.
 - i. Preventative failure alerts through a manufacturer provided, cloud based, cellular remote monitoring system.

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F. Heating System:

1. The gas burner shall be an indirect-fired, push-through type, using liquid propane gas. The inlet-supply pressure to the unit for liquid propane gas, the minimum inlet supply pressure to the unit must be 11" w.c.
2. Burner shall be a tubular in-shot fired design capable of using LP gas. Each burner ignition shall be of the direct-spark design with remote flame sensing at inlet of the last firing tube of the gas manifold.
3. Direct-sparking sequence shall last through the complete duration of the trial for ignition period for guaranteed light-off. Burner shall always be lit at maximum gas flow and combustion airflow for guaranteed light-off. Each burner ignition module shall have LED indicators for troubleshooting and a set of exposed prongs for testing flame indication signal.
4. All furnaces shall be controlled by an electronic Vernier-type fully modulating control system capable of achieving 80% combustion efficiency over the entire gas firing range of the unit.
5. Each furnace shall have:
 - a. A minimum turndown ratio of 10:1 for LP gas while maintaining a constant 80% efficiency (90% for high efficiency furnace option). No cold air bypass of the heat exchanger.
 - b. Each furnace heat exchanger shall be a bent-tube style design made entirely of stainless steel.
 - c. Stainless steel Quick Seal Connection for gas connection.
 - d. Manifold and Input gas pressure gauges.
 - e. Factory piped condensate drain to exterior of cabinet.
 - f. A combustion flue to be installed on adjacent side as combustion intake with integrated high velocity wind cap.
 - g. A blocked vent safety airflow switch with high temperature silicone tubing operating off of absolute pressure measured inside of the power-vent blower housing.
 - h. A high temperature auto-recycling limit with a maximum non-adjustable set point.
 - i. A manual reset high temperature flame rollout switch with a non-adjustable set point.
 - j. Each furnace compartment shall have a removable post and panel that allows the furnace to be easily removed for service and maintainability.
 - k. A power-vent assembly for exhausting flue gases with a PSC or ECM type motor that is securely mounted and easily accessible/removable for service.
 - l. A 0-10"w.c. gas pressure gauge installed on the gas manifold.

G. Filters:

1. Provide filters as part of unit. All filters shall be furnished and installed to meet the performance requirements set forth in the schedule and as specified under another section of this work.
2. All filters shall be installed on tracks for easy removal from the unit.
3. Up to 3 layers of outdoor air filtration installed. Unit shall ship with a 2" washable metal mesh outdoor air filter. Mixed air shall have 2" MERV-8 filters and 2" MERV-13 filters.
4. Unit shall have an adjustable pressure differential sensor for the filter bank to alert in the event of a clogged filter.
5. Provide unit with minimum 3 sets of filters. Initial filters shall be used during unit operation in construction. Construction filters shall be changed by the contractor if required. 2 sets of filters shall be retained until final completion, at which time one clean set of filters shall be installed and a second clean set of filters shall be provided to the owner.

H. Electrical:

1. All controls shall be pre-wired and housed in an insulated electrical cabinet within the unit to protect against risk of condensation.
2. Unit shall be provided with single point electrical connection, 208 volt, 3 phase, ampacity as scheduled.
3. Unit shall be provided with a door safety switch that de-energizes the supply fan when the door is opened.
4. Unit shall be provided with a factory mounted averaging supply air temperature sensor to allow for accurate discharge temperature readings within unit when a downstream sensor is not installed. Field mounted and wired discharge air sensors will not be accepted.
5. Unit shall be provided with a factory mounted averaging intake air temperature sensor to allow for accurate intake temperature reading regardless of how the OA/RA dampers are positioned.
6. The electrical cabinet shall be outfitted with the following:
 - a. Disconnect for power to fully de-energize the electrical cabinet.
 - b. LED electrical cabinet service light with automatic activation upon door switch.
 - c. Color wiring schematics, laminated to the interior wall of the cabinet doors.
 - d. Factory mounted disconnect with unit bottom knockouts.
 - e. A LED backlit, LCD Human-Machine Interface (HMI) shall be mounted within the unit's control cabinet to allow for all set points configurations and system monitoring at the unit. Up to 4 additional space HMIs or wall mount sensors may be assigned to a unit.

- f. Space HMI #
 - 1) HMIs allow for full programming capabilities and are outfitted with integral temperature and humidity sensors. Additional HMIs shall be capable of being individually averaged for space temperature/humidity readings. All HMIs shall be wired using standard CAT5/6 cables.
 - 2) CAT5/6 cables shall be field supplied.
7. All sensors shall be wired back to the main control board that continuously monitors all critical components and makes decisions based on pre-determined logic to accurately control the following:
 - 1) PID logic to control heater modulation ensuring precise discharge/space temperature control.
 - 2) PID logic to control compressor speed to provide precise control over evaporative coil temperatures, leaving dew point, and discharge/space temperatures.
 - 3) PID logic for Outdoor fan modulation to maintain an optimal outdoor coil temperature.
 - 4) PID logic for Electronic Expansion Valve (EEV) position to maintain a precise superheat temperature.
 - 5) PID logic for Modulating Reheat valve to limit supply air temperature and relative humidity based off of space or discharge conditions.
- I. Controls:
 1. Unit shall be outfitted with a control board to allow for full control of the entire unit.
 2. Provide air flow switch on the supply fan system to sense air flow with available set of contacts for connection to external owner systems.
 3. All unit controls shall be compatible with BACnet and LonWorks based building management systems. (Although this facility will not initial have a BMS system).
 4. All units shall be outfitted with CASLink cloud based monitoring, which monitors every point of operation. Provides configurable automated fault alert e-mails, and remote control capabilities.
 5. Integrated cellular module to provide remote connection to monitoring services to view both real time and historical unit operation. Data shall be stored a minimum of 3 years on the cloud. Data sample rate shall be a maximum of 60 seconds.
 6. Temperature Control System
 - a. Low-Ambient Cooling: Unit is factory outfitted with logic allowing for low-ambient operation of the DX system down to 0°F outdoor temperatures purely through software utilizing the standard factory modulating components.

- b. Space Temp Control (Heating): Unit modulates the burner flame (current supply in the case of electric heating) to accurately maintain the desired space temperature set point and compensate for fluctuations in entering air temperature, air volume and % of OA using heating PID controls designed specifically for the Paragon. Minimum and maximum discharge set points can be set to limit the temperature entering the space. An HMI or room thermostat can be used to determine the space temperature. In the case that no temperature sensor is available in the space, the unit will use an internal return temperature sensor.
- c. Space Temp Control (Cooling): Unit modulates the compressor frequency to accurately maintain the desired space temperature set point and compensate for fluctuations in entering air temperature, air volume and % of OA using cooling (heating when in heat pump mode) PID controls designed specifically for the Paragon. Minimum and maximum discharge set points can be set to limit the temperature entering the space. An HMI or room thermostat can be used to determine the space temperature. In the case that no temperature sensor is available in the space, the unit will use an internal return temperature sensor.
- d. Space Humidity Control (Dehumidification): Unit modulates the compressor frequency to accurately maintain a desired evaporative coil dew point measured via a coil mounted temperature sensor between the evaporative and hot gas reheat coils. A fully modulating hot gas reheat valve shall utilize excess waste heat from the condensing section feeding the hot gas reheat coil with the precise amount of heat needed to accurately reheat the airstream in order to maintain a desired space temperature compensating for fluctuations in entering air temperature, air volume and % of OA using proprietary dehumidification PID controls designed specifically for the Paragon.

7. Activation Controls (For Paragon Units):

- 1) Activate Based on Intake (Heating): Unit will activate heating when the intake temperature drops below the desired set point.
- 2) Activate Based on Intake (Cooling): Unit will activate cooling when the intake temperature rises above the desired set point.
- 3) Activate Based on Intake (Dehumidification): Unit will activate dehumidification when the intake conditions rise above the desired intake set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
- 4) Activate Based on Space (Heating): Unit will activate heating when the space temperature drops below the desired set point.
- 5) Activate Based on Space (Cooling): Unit will activate cooling when the space temperature rises above the desired set point.
- 6) Activate Based on Space (Dehumidification) Unit will activate dehumidification when the space set point rises above the desired space set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.

- 7) Activate Based on Both (Heating): Unit will activate heating when the space AND intake temperature drop below the desired set point.
- 8) Activate Based on Both (Cooling): Unit will activate cooling when the space AND intake temperature rise above the desired set point.
- 9) Activate Based on Both (Dehumidification): Unit will activate dehumidification when the space and intake set point rise above the desired space and intake set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
- 10) Activate Based on Either (Heating): Unit will activate heating when the space OR intake temperature drops below the desired set point.
- 11) Activate Based on Either (Cooling): Unit will activate cooling when the space OR intake temperature rises above the desired set point.
- 12) Activate Based on Either (Dehumidification): Unit will activate dehumidification when the space or intake set point rises above the desired space or intake set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
- 13) Activate Based on Stat (Heating): Unit will activate heating when the space thermostat sends a 24V signal to W and G on the main control board. Unit will modulate to maintain a constant discharge heat set point.
- 14) Activate Based on Stat (Cooling): Unit will activate cooling when the space thermostat sends a 24V signal to Y and G on the main control board. Unit will modulate to maintain a constant discharge cool set point.

J. Roof Curb:

1. Provide unit with minimum 16" tall roof curb for mounting on grade mounted concrete pad in the mechanical yard. Curb shall be factory assembled, and constructed of minimum 18-gauge steel.

K. Variable Frequency Drive:

1. Provide Variable Frequency Drive for the compressor as part of the AC unit. VFD shall be furnished and installed to meet the performance set forth in the schedule and as specified under another section of this work.
 - a. Accessories to be furnished and mounted by the drive manufacturer and contained in a single enclosure. (The use of more than one enclosure is not acceptable).
2. Provide Variable Frequency Drive for speed control on all non-ECM direct drive supply fans.
3. All VFDs shall provide the following inherent protections:
 - a. Phase protection.

- b. Brownout protection
- c. Overload/Overheat protection.
- d. Soft starts to protect bearings/hardware.
- e. Low & High voltage & over-torque protections.

L. Warranty:

1. Unit shall be provided with the following standard warranties:
 - a. 10-Year (non-prorated) parts warranty covering the entire unit when accompanied by a company provided service plan. 5-Year (non-prorated) parts warranty covering the entire unit otherwise.
 - b. 25-year (non-prorated) parts warranty for SS heat exchanger on indirect fired units.
2. The contractor shall ensure that the following actions do not occur, all of which could impact the equipment warranty:
 - a. The equipment is not installed by a qualified installer per the manufacturer's installation instructions shipped with the product.
 - b. The equipment is not installed in accordance with Federal, State, and Local codes and regulations.
 - c. The equipment is misused, neglected, or not maintained per the manufacturer's maintenance instructions.
 - d. The equipment is not operated within its published capacity.
 - e. The invoice is not paid within the terms of the sales agreement.

PART 3 EXECUTION

3.01 GENERAL

- A. All equipment and materials, specified herein or shown on the drawings shall be installed complete, coordinated with all other work, tested and made tight and put into safe controlled operation to perform its intended function as a part of this project.

3.02 MAKEUP AIR HANDLING UNIT

- A. Coordinate all openings and location with structural systems.
- B. Contractor's attention is directed to Section 23 05 48 Vibration Controls for HVAC Systems requirements.
- C. Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual and all applicable building codes.
- D. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts.

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E. Electrical: Conform to applicable requirements in Division 26 Sections.

F. System start up shall be performed by a factory trained Service Technician

END OF SECTION

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SECTION 23 80 00 - DECENTRALIZED HVAC EQUIPMENT

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.
- B. UL 507 - Electric Fans; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Work Included:
 - 1. Energy Recovery Ventilator
 - 2. HVAC Split Systems
 - 3. HVLS Circulation Fans
 - 4. Miscellaneous Appurtenances
- C. Related Sections:
 - 1. Section 23 00 10 – HVAC General Requirements
 - 2. Section 23 01 00 – Operation and Maintenance of HVAC Systems
 - 3. Section 23 05 00 – Common Work Results for HVAC
 - 4. Section 23 05 48 – Vibration Controls for HVAC Systems
 - 5. Section 23 05 53 – Identification for HVAC Systems
 - 6. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
 - 7. Section 23 20 00 – HVAC Piping
 - 8. Section 23 30 00 – HVAC Air Distribution
 - 9. Section 23 70 00 – Central HVAC Equipment

1.03 REFERENCES:

- A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.
- B. Air Conditioning and Refrigeration Institute (ARI):

Standard 210	Standard for Unitary Air Conditioning Equipment

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Standard 240	Standard for Unitary Heat Pump

C. American National Standards Institute (ANSI):

Standard B31.1	Code for Pressure Piping

D. American Society of Heating, Refrigeration and Air Conditioning Engineers (ANSI/ASHRAE):

Standard 15	Safety Code for Mechanical Refrigeration

E. National Fire Protection Association (NFPA):

Standard 90A	Air Conditioning and Ventilating Systems of other than Residence Type

F. National Electrical Manufacturers Association (NEMA)

G. Sheet Metal and Air Conditioning Contractors' Association (SMACNA)

a. Duct Construction Standards (Latest Edition)

H. Underwriters Laboratories, Inc. (UL)

1.04 EQUIPMENT LABEL

A. All mechanical equipment and appliances shall be listed and labeled by a nationally recognized testing and inspection agency approved by the authority having jurisdiction. All equipment and appliances shall be installed in accordance with the conditions of the listing. Manufacturer's installation instructions shall be available at the job site at the time of inspection.

1.05 SUBMITTALS

- A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.
- B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.
- C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

1.06 SPARE PARTS

A. Each HVAC unit shall be provided with 3 sets of filters. At end of construction each unit shall be provided with a clean filter and one set shall be turned over to the Owner as spares.

PART 2 PRODUCTS

2.01 ENERGY RECOVERY VENTILATION UNIT (ERV-1) S

A. Basis of design manufacturer: Greenheck model ERVe-20-30L, performance as scheduled on sheet M6.01. The ERV Unit shall be fully assembled at the factory and consist of an insulated metal cabinet, outdoor air intake, energy wheel, motorized intake damper, motorized exhaust

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damper, frost control, filter assembly for intake and exhaust air, supply air blower assembly, exhaust air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.

B. Unit cabinet: Materials: Formed double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance

1. Unit's exterior shall be supplied from the manufacturer using G60 galvaneal steel with proprietary pre-painted material in the following finish color; Concrete Gray-RAL 70023. This has been subjected to a salt spray test per ASTM B117.
2. Internal assemblies: 18 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.
3. Access doors shall be hinged.
4. Shall have factory-installed duct flanges on all duct openings.
5. The cabinet insulation shall be fiberglass within the double wall construction, 1-inch thick, 3 lb/ft³ density.
6. Supply Air and Exhaust Air blower assemblies: Blower assemblies consist of an electric motor and a direct driven blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on 1.125-inch-thick neoprene vibration isolators.
7. Control panel/connections: Energy Recovery Ventilator shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections.
8. Frost control: Modulating Wheel. Modulating frost control. Control system shall include an outdoor air thermostat and pressure sensor on the wheel assembly to initiate frost control sequence.
9. Motorized Dampers: Motorized dampers of low leakage type and leakage rate of 3 CFM/ft² @ 1 in. wg shall be factory installed.

C. Blowers:

1. Blower section construction, Supply Air and Exhaust Air: Direct drive motor and blower shall be assembled onto a 14-gauge galvanized steel platform and must have neoprene vibration isolation devices.
2. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.
3. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.
4. Backward Inclined (BI) fan wheels: Galvanized or aluminum construction.

D. Motors:

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1. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase, and enclosure. Fans shall be direct drive, NEMA Premium efficiency, ODP Enclosure, and 1/2 horsepower as scheduled.

E. Energy Wheel:

1. Energy wheel: Energy wheel shall be of total enthalpy, rotary air-to-air type and shall be an element of a removable energy wheel cassette. The cassette shall consist of a galvanized steel framework (designed to produce laminar air flow through the wheel), an energy wheel as specified and a motor and drive assembly. The cassette shall incorporate a pre-tensioned drive belt. The wheel media shall be a polymer film matrix in a stainless-steel framework and be comprised of individual segments that are removable for servicing. Non-segmented energy wheels are not acceptable. Silica gel desiccant shall be permanently bonded to the polymer film and shall be designed and constructed to permit cleaning and servicing. The energy wheel is to have a five-year warranty. Performance criteria are to be as specified in AHRI Standard 1060, complying with the Combined Efficiency data in the submittal.

F. Filter: The ERV shall be equipped with factory installed, 2" pleated MERV-8 filters on both the intake and exhaust air stream entering the ERV.

G. Electrical: The unit will require a 208 Volt, single phase power supply, single point connection.

H. Control:

1. This unit shall be controlled by a factory-installed microprocessor programmable controller that is connected to various optional sensors. Note that the facility does not include a BAS system.
2. Unit shall have factory installed variable frequency drives for modulation of the blower motors, although the speed shall be set to meet the constant volume application of the ERV.
3. Supply and exhaust fans shall be set for constant volume airflow matching scheduled values.
4. Remote Display: Contractor shall provide and install a remote display that functions as a remote indicator of owner-selected operating parameters and also permits remote inputting of new operating parameters. Each remote display shall have a large LCD user interface screen.
5. Set operation of the ERV to match the occupied schedule of the airport side of the terminal building. Occupied schedule shall not be impacted by the restaurant or kitchen occupied schedule.
6. Sensors: Include alarms for sensors at the remote display.
 - a. Dirty Filter Sensors
 - b. Temperature Sensors, OAD and OAI (both standard with microprocessor).
 - c. Relative Humidity Sensors – OAH, RAH

d. Wheel Rotation Sensor

1) Warranty:

7. Provide 1 year parts and labor warranty for entire unit. Provide 5 year energy recovery wheel warranty.

2.02 HVAC SPLIT SYSTEMS (IU-1 TO IU-4, HP-1 TO HP-4) S

- A. Basis of design manufacturer: Samsung electric split system with variable speed inverter compressor technology. The system shall consist of a vertical discharge, three phase outdoor unit (HP-1) and horizontal discharge, single phase outdoor units (HP-2, HP-3 & HP-4), a matched capacity horizontal indoor fan coil unit that shall be equipped with a wired wall-mounted remote controller. Indoor and outdoor units selection and capacity as scheduled on sheet M6.01.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within the specified warranty period. For compressor: seven years from date of installation. For parts: two years from date of installation. For labor: two years from date of installation.
- C. Indoor units
1. General: Equal to Samsung model number as scheduled on drawing M6.01. The unit shall be a convertible style unit for horizontal installation. The unit shall be tested in accordance with ANSI / ASHRAE 193 and have less than 2% air leakage at maximum airflow setting. Unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board, and fan motor. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
 2. Unit Cabinet: The cabinet shall be pre-painted, pre-insulated, 22-gauge galvanized steel.
 3. Filters: Provide unit with Filter Box model VFB-3 at unit return with 1" MERV-8 filters.
 4. Fan: The indoor unit fan shall be an assembly with direct drive sirocco fan(s) with a high efficiency DC motor. The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor unit shall have a ducted air outlet system and ducted return air system.
 5. Coil: The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy. The coils shall be pressure tested at the factory. Both refrigerant lines to the indoor units shall be insulated in accordance with the installation manual. A condensate pan and drain shall be provided under the coil.
 6. Refrigerant: Unit shall utilize R-32 refrigerant with integral A2L leak detection.
 7. Control: Provide wired wall mounted touchscreen controller, model MWR-SH12UN.
 8. Electrical: The indoor unit electrical power shall be 208 volts, 1-phase, 60 hertz. Where indicated in the equipment schedule, indoor unit shall be powered by the outdoor unit.

D. Outdoor unit:

1. General: Equal to Samsung model number as scheduled on drawing M6.01. The system shall utilize low-GWP R-32 refrigerant. The compressor(s) shall be hermetically sealed, inverter driven, flash injected scroll type. The outdoor unit shall pump down the refrigerant in the event an indoor unit detects a refrigerant leak. The sequence of operations shall include closing refrigerant isolation valves at the end of the pump down process to secure as much refrigerant as possible in the outdoor unit in the event of refrigerant leakage within an indoor door unit. Refrigerant flow shall be controlled by an EEV (electronic expansion valve) throughout the system. A flat plate subcooler device will improve capacity at extreme system refrigerant pipe lengths and reduce refrigerant noise. Control wiring shall be 2 x 16 AWG wire. The outdoor unit shall have snow accumulation prevention option setting to prevent snow drifting against an idle outdoor unit.
2. Unit cabinet: The casing shall be fabricated of galvanized steel, bonderized and finished with a powder coated baked enamel.
3. Fan: The unit shall be furnished with one or two direct drive, variable speed fan(s). The fans shall be propeller type blades. The fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed. The fan motors shall be mounted for quiet operation. The fans shall be provided with a raised guard to prevent contact with moving parts. The outdoor unit shall have a horizontal or vertical discharge airflow as indicated.
4. Refrigerant: The system shall include an R32 alarm output plug on the indoor unit and outdoor unit for notification of R32 leak when an indoor unit refrigerant leak detector detects a leak (MIM-B14U accessories are required).
5. Coil: The outdoor coil shall be of nonferrous construction with lanced or corrugated fins on copper tubing. The coil fins will have a factory applied corrosion resistant blue-fin finish. The coil shall be protected with an integral metal guard. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.
6. Electrical: the outdoor unit electrical power shall be 208 Volt, 1-phase, 60 hertz.
7. Controls: The unit shall react to heating/cooling demand as communicated from connected indoor units over the control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer. The outdoor unit shall be controlled by integral microprocessors. The control circuit between the indoor units and the outdoor unit shall be 24VDC, completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

2.03 HVLS CIRCULATION FANS (HLVS-1, HLVS-2 & HVLS-3) S

- A. HVLS circulating fans shall be manufactured by Big Ass Fans. Fan shall be 8-foot diameter Essence, performance as scheduled on sheet M6.01. Fan shall be UL 507 listed.
- B. Motor: Virtually silent, gearless direct-drive motor.
- C. Airfoils: 8 anodized aluminum airfoils with safety restraints.

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- D. Controls: Provide with the Smartsense fan controller, one for each fan.
- E. Mounting: Include mounting hardware for structure coordinated for the type structure provided.
- F. Voltage: 120VAC, single phase.
- G. Finishes: Provide stealth black finish. Note color selection in the submittal.

2.04 MISCELLANEOUS APPURTENANCES

- A. Miscellaneous electric appurtenances such as transformers, solenoid valves, electric relays, selector switches, on-off switches, pilot lights and other similar items required by the control sequence and not shown to be provided by the Electrical Contractor shall be provided as part of the Mechanical Contract.
 - 1. Solenoid valves shall be Asco or Alco of coil rating and size to accomplish the indicated requirement.
 - 2. On-Off switches shall be toggle type, 20 amp. contract rating complete with engraved cover plate where required.
 - 3. Selector switches shall be manual selector type with the indicated poles and contacts and engraved cover plate. Contact rating shall be a minimum of 20 amps.
 - 4. Relays shall be G.E., Square D, or Cutler-Hammer 20 amp rating with sufficient contacts for the sequence indicated.

PART 3 EXECUTION

3.01 GENERAL

- A. All equipment and materials, specified herein or shown on the drawings shall be installed complete, coordinated with all other work, tested and made tight and put into safe controlled operation to perform its intended function as a part of this project.
- B. All rooftop equipment shall be secured to the roof framing structure.

3.02 ENERGY RECOVERY VENTILATOR

- A. Engage an authorized service representative to perform startup service. Clean entire unit and install clean filters.
- B. Measure and record electrical values for voltage and amperage.
- C. Perform airflow testing, adjusting and balancing. Set VFD speed and airflows for supply and exhaust to values indicated in equipment schedule and on plans.
- D. Contractor's attention is directed to Section 23 05 48 for isolation requirements.

3.03 HVAC SPLIT SYSTEM UNITS

- A. Outdoor Units:
 - 1. Install level on grade on concrete pad. See mechanical details for additional notes.

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2. Coordinate all openings and location with structural systems.
3. Install and connect unit in accordance with manufacturer's recommendations and contract drawing details. Should conflicts in the two occur notify the Architect/Engineer

B. Indoor Units:

1. Coordinate installation locations with other disciplines, architectural and structural systems.
2. Maintain manufacturer recommended service clearances.
3. Contractor's attention is directed to Section 23 05 48 for isolation requirements.
4. Install and connect unit in accordance with manufacturer's recommendations and contract drawing details. Should conflicts in the two occur notify the Architect/Engineer.

C. System Training:

1. As part of this contract, the HVAC System manufacturer and installer shall provide up to four (4) hours of training to the owner and their designated personnel on system operation, unit controls, unit configuration, scheduling, system adjustment, maintenance and related topics.

3.04 CIRCULATION FANS

- A. Coordinate fan location with ductwork and structural systems.
- B. Coordinate electrical requirements with Division 26.
- C. Coordinate control of fan(s) with controller and owner requirements.

END OF SECTION

SECTION 26 05 00 - – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Every item of labor, material, devices, and appurtenances for installing a complete Electrical System and other related systems included in Division 26 of the Specifications.
 - 1. Section 26 05 00 – Common Work Results for Electrical
 - 2. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
 - 3. Section 26 05 23 – Control Voltage Electrical Power Cables
 - 4. Section 26 05 26 – Grounding and Bonding for Electrical Systems
 - 5. Section 26 05 33 – Raceway and Boxes for Electrical Systems
 - 6. Section 26 05 43 – Underground Raceways for Electrical Systems
 - 7. Section 26 05 53 – Identification for Electrical Systems
 - 8. Section 26 09 24 – Lighting Control System
 - 9. Section 26 20 00 – Low-Voltage Electrical Distribution
 - 10. Section 26 24 16 – Panelboards
 - 11. Section 26 27 26 – Receptacles
 - 12. Section 26 28 13 – Fuses
 - 13. Section 26 28 16 – Enclosed Switches
 - 14. Section 26 29 00 – Low-Voltage Controllers
 - 15. Section 26 43 00 – Surge Suppression Device (SPD)
 - 16. Section 26 50 00 – Lighting

1.03 RELATED WORK

- A. General: See all other portions of these Contract Documents and apply to those portions of work, relating to Electrical Work, the same as if repeated herein in its entirety. The Division 26 Electrical Trade shall allow for wiring and controlling all equipment requiring electrical connections as described therein even though not shown on the electrical drawings. The Division 26 Electrical Trade shall provide and install all conduits, standard boxes, and grounding for Divisions 27 and 28 Trades. Divisions 27 and 28 Trades shall provide all special

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boxes, cabinets, and enclosures to Division 26 Electrical Contractor for installation. The Division 26 Electrical Contractor shall coordinate with Divisions 27 and 28 Trades for sizes and locations of conduits, boxes, cabinets, and enclosures required by Divisions 27 and 28 Trades. The Division 26 Electrical Trade shall provide and install all conduits, standard boxes, cable trays, and grounding for Division 27 & 28 Trades.

- B. Division 11 - Equipment
- C. Division 23 – Mechanical
- D. Division 22 – Plumbing
- E. Division 27 – Communications
- F. Division 28 – Electronic Safety and Security

1.04 WORK NOT INCLUDED

- A. Certain electrical equipment will be provided in-place as specified under other Divisions of these Contract Documents and other pieces of equipment such as operating controls, etc., will be provided f.o.b. (freight on board) premises, which shall be mounted and connected to electrically under Division 26.

1.05 DRAWINGS

- A. Where conduit, equipment, devices, and other electrical appurtenances are shown on the drawings, the general arrangement of such items on the electrical drawings shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the electrical drawings, it is not feasible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

1.06 QUALITY ASSURANCE

- A. Equipment and material used in the project shall be new and undamaged. The electrical installation shall fit into the space allotted and shall allow adequate, acceptable, clearances for entry, servicing, safety, and maintenance. The Contractor shall coordinate the work to ensure that the equipment may be moved into place without altering building components or other installations. All Electrical work shall be performed by a Commonwealth of Virginia Class-A licensed Electrical Contractor whose technicians, mechanics, or tradesmen shall be skilled in the trade involved. All electrical work shall be performed under the direct supervision of an electrician with a locally recognized and accepted master license.

1.07 REFERENCES

- A. The complete installation and all materials and equipment under Division 26 shall conform to the Virginia Uniform Statewide Building Code, current issue, including all applicable portions of the National Electrical Code (NEC) and all other governing codes and regulations.

- B. All equipment used shall bear the Underwriters Laboratory (U.L.) label for the intended application, or other organizations label if acceptable to the Authority having jurisdiction and concern with product evaluation.
- C. In addition, the following codes, standards, and regulations shall apply to the complete installation and all materials and equipment. These are referred to by their accompanying abbreviations.
 - 1. National Electrical Code (NFPA No. 70) 2020 NEC
 - 2. National Electrical Manufacturers Association NEMA
 - 3. Underwriters Laboratories, Inc. UL
 - 4. Telecommunications Building Wiring Standards TIA/EIA
 - 5. All Systems' Installation Certification Compliance Documents for Installing Trades
 - 6. National Fire Protection Association NFPA
 - 7. Uniform Federal Accessibility Standards UFAS
 - 8. Americans with Disabilities Act Accessibility Guideline ADAAG
- D. The above standards are intended as a minimum and shall be exceeded if required by the Contract Documents. In the event information contained in the Contract Documents conflicts with one of the above mentioned codes, the codes shall take precedence.

1.08 PERMITS, LICENSES, TAXES, AND INSPECTION CERTIFICATES

- A. All permits, bonds, licenses, electrical connection fees, inspection fees and taxes required for the execution of the work shall be obtained and paid for by the Contractor. Under each phase of the Electrical work the Contractor shall furnish three copies of certificates of final acceptance to the Engineer from any inspection authority having jurisdiction.
- B. At the completion of the job, provide the Architect/Engineer and Owner with a copy of an electrical inspection certificates from the local Electrical Inspector if such inspection is provided and/or required by the locality.

1.09 REGULATIONS AND STANDARDS

- A. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a minimum and shall be exceeded if required by the specifications or Drawings. In the event of a conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standard, or regulation shall take precedence.

1.10 SUBMITTALS

- A. Submit shop drawings, product data and samples in accordance with Division 1 for all items as specified in related sections of these specifications. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for

review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements.

Contractor's stamp shall identify the paragraph and page number for which the submittal is being made. Any submission which has not been reviewed and stamped by the Electrical Trade will not be reviewed by the Engineer. No reviews prior to award of Contract will be considered or accepted.

- B. Shop drawings, samples, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these contract documents shall be submitted as follows:
1. All the equipment and materials where submissions are specifically required by other Divisions of these Contract Documents.
 2. All the equipment and materials that are indicated with an S behind the product title. This shall include submission of the specified products equipment and materials.
 3. All the equipment and materials that are acceptable equal substitution.
 4. If submission is NOT required for the SPECIFIED products "shop drawings and product data" under 1. and 2. above, the Contractor shall NOT submit a shop drawing for the SPECIFIED products.
 5. Samples, in good working order, shall be submitted in accordance with Division 1, complete with all installation and service drawings and instructions. All samples will be returned at the submitter's expense unless otherwise indicated. Samples may be subject to destructive testing by Architect/Engineer.
- C. Operation and Maintenance manual(s) shall be submitted in accordance with Division 1 and shall include a complete product index, a copy of all accepted shop drawings, installation and maintenance data, sequence of controls, parts lists, and the name, address and telephone number of supplier or nearest representative. All electrical devices, equipment and systems marked O/M in these specifications shall be included and all other such electrical items which will require servicing before the duration of its useful life has been reached. The manual(s) shall be presented to the Engineer for review and transmitted to the Owner before the final payment is recommended.
- D. Equivalents: Manufacturers, trade names and model numbers indicated herein and on drawings shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Unless definitely stated otherwise and upon complying with Division 1, the Contractor may use any article of equal appearance which, in his judgment is equal to that specified and is accepted by the Engineer. Where three or more manufacturers are named in the specifications for any item, the Contractor should use one of the manufacturers. No others shall be reviewed or accepted. Manufacturers listed first in these specifications and on drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes, and capacities of all other manufacturer's items, both items named herein, or items proposed. If the equipment necessitates changes in power distribution, conduit, wiring, lighting, wiring, ductwork, piping, or any other building systems from that indicated on the drawings, the Contractor shall be responsible for all additional costs included and notify other trades of the changes. Where such changes are required, detail drawings

indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval. See Division 1 for substitutions.

- E. The ten day prior approval requirements of The Instructions to Bidders, AIA 701, are waived for this Division of the Specifications, and unless stated otherwise the Contractor may use items that he deems as equivalent in quality and performance to the specified item subject to final acceptance of substituted items by the Engineer upon his review of shop drawings.
- F. Guarantee: Electrical equipment, materials and labor required by these specifications and accompanying drawings shall be guaranteed to be free from defective materials or workmanship, including lamps, for a period of one year after final acceptance of the project except extended warranties as specified elsewhere in these documents on specific items of equipment will be furnished by the Trade providing the equipment. Defects in material or workmanship occurring during this period shall be corrected with new material and equipment or additional labor at no cost to the Owner. Manufacturer's certificates of warranty shall be transmitted to the Owner before final payment is recommended.

1.11 WARRANTIES

- A. The Contractor shall warrant for a period of one year all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.
- B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.
- C. Refer to Division 1 for additional warranty requirements.
- D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

1.12 EXCAVATION AND BACKFILLING

- A. General: The Electrical Trade shall perform all excavations of every description and of whatever substances encountered, to the depths required for installation of his work. (No extras will be allowed for rock.) All excavated materials not required or suitable for backfill shall be removed and wasted as indicated on the drawings or as directed by the Engineer. OSHA approved shoring methods shall be provided as necessary to protect existing facilities, new work, and the safety of personnel. Excavation shall be open cut except that short sections of a trench may be tunneled if the conduit can be properly installed. Backfilling shall not commence until all tests have been performed and all utility systems conform to the contract documents. Refer to Section 26 05 43 for detailed specifications.
- B. Protection of Existing Utilities: Existing utility lines to be retained, whether known or unknown and uncovered during excavation operations, shall be protected from damage during excavations and backfilling, and if damaged, shall be restored to original condition.

1.13 COORDINATION OF WORK

- A. General: The contract documents indicate the extent and general arrangement of the electrical systems. The Contractor shall be responsible for the coordination and proper relation of the electrical work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.
- B. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.
- C. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the electrical drawings are intended only as a guide to indicate relative locations of the electrical work. Refer to architectural and structural drawings for building construction details. If conflicts prevent installation of electrical work at the locations indicated, minor deviations shall be made subject to acceptance by the Engineer, and without additional compensation.
- D. Cutting and Patching: Unless stated otherwise, the Electrical Trade shall do all cutting necessary for the installation of his work. All work should be installed sufficiently in advance of new construction in order to permit installation of supports, sleeves, and similar items without cutting. Cutting which will in any way affect the building structure shall not be performed without permission of the Architect-Engineer. The Electrical Trade is responsible for patching where he does cutting. Patching shall be done to the satisfaction of the Architect-Engineer.
- E. Roughing-In: Receptacles, switches, and other similar items shall align vertically or horizontally with each other, hose bibbs, thermostats, the building structure and features thereof when it appears obvious and logical that they should. All mounting heights shall be within the limits of Commonwealth of Virginia USBC and ADAAG.
- F. Damage to Other Work: The Electrical Trade is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Trade who installed the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Electrical Trade.

1.14 ASBESTOS

- A. Asbestos Free Materials: The intention of these drawings and specifications is that there be no asbestos containing materials installed on this project. To the best of the Architects' and Engineers' knowledge, none of the material or equipment specified herein or shown on the drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos containing materials were used for or in the construction of this project.

1.15 GRAPHICS DATABASE

- A. This project's Computer Aided Design & Drafting (CADD) drawing files may be obtained directly from the Engineer for use in preparing computer graphics specific to this project.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND MATERIALS

- A. General: Manufacturers and materials shall be as specified in subsequent sections of these specifications and as noted on the drawings. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise.

2.02 SLEEVES AND INSERTS

- A. General: Sleeves and inserts shall be provided and correctly located in the structure, as required for the work.
- B. Inserts shall be steel and of proper size for loads encountered.

2.03 ACCESS DOORS

- A. Provide for all junction boxes or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for work shall be furnished as a part of this Division to the General Contractor for installation. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors occurring in rated construction shall be fire rated U.L. labeled access doors correlated to preserve the integrity of the rated construction. Doors shall be prime finish steel except those in toilets, shower rooms, locker rooms, kitchens and other similar areas shall be aluminum with natural anodized finish. Doors shall match the access doors in Division 23 and meet the acceptance of the Architect.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Materials and equipment shall be installed in accordance with manufacturer's instructions to conform to the details and application as specified in subsequent sections of these specifications and indicated on the drawings.
- B. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes, but is not limited to, frames or supports for items such as switchboards, panelboards, lighting fixtures, disconnect switches, junction boxes, conduit, motor starters, outlet boxes, and other similar items requiring supports. Floor mounted equipment in Equipment Rooms shall be set on 4-inch high concrete foundation pads unless shown otherwise. Foundation drawings, bolt setting information and foundation bolts shall be furnished by the subcontractors furnishing the equipment that is required to have concrete foundations. Concrete for foundations shall be provided by Electrical Trade and in accordance with Division 03 - Concrete Work, unless noted otherwise.
- C. Sleeves: Provide sleeves for all conduits passing through concrete or masonry walls, partitions, concrete slabs, or beams installed during construction of the wall, partition, slab, or beam. Sleeves placed horizontally in walls or in any position in beams shall be standard weight ASTM A53 steel pipe of length equal to thickness of wall or beam. Those placed vertically in

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non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors of rooms where hose bibbs or floor drains provided under Division 21 occur, and in pipe spaces, shall be standard weight steel pipe projecting 1/2" above the finished floor except in Equipment Rooms they shall project four (4) inches above floor. Sleeves in floors with waterproof membrane shall be provided with flanges or flashing rings and shall be clamped or flashed into membrane. All sleeves shall be of sufficient diameter to allow installation of conduit except sleeves on lines subject to movement, which shall clear the conduit at least one inch all around. Conduits through exterior walls, or floors, below grade shall have seals specified in Section 26 05 43 between the conduit and wall sleeve. Sleeve shall have anchor and water stop plate. The entire assembly shall be tightened and adjusted to make watertight. Sleeves for insulated wiring and conduit, penetrating fire (and smoke) rated partitions, walls and floors shall have seals as specified in Section 26 05 43 and shall be sealed in accordance with the terms of U.L. Listed Through-Penetration Firestop Systems (XHEZ) as published in the U.L. Fire Resistance Directory. Penetrations shall exactly conform to details of the Firestop System indicated for the type of partition, wall and floor construction encountered. All firestopping of sleeves for electrical work shall be provided under Division 26.

- D. Temporary Requirements: Openings in equipment shall be kept capped at all times until connection is made to the system. The ends of all conduits and equipment openings shall be kept capped properly with approved devices. Approved devices are items such as specially molded plastic caps and sheet metal caps.
- E. Access Doors: Provide access doors for all concealed electric equipment, pull boxes, junction boxes or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for Electrical work shall be furnished by the Electrical Trade, to the Contractor for installation. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Placement of access doors shall be approved in advance by the Architect.
- F. Painting: All work under this Division shall be painted in accordance with Section 26 05 53, Identification for Electrical Systems. Division 26 shall also paint and identify all conduits and boxes for Divisions 27 & 28 as described in Section 26 05 53.

FIELD QUALITY CONTROL

- A. System Readings: Certain system voltage and current readings shall be taken, the values recorded and submitted in triplicate to the Engineer. Two complete sets of readings are required, one under no load and one under maximum available load. The current and voltage shall be recorded on each phase (plus voltage between all phases) at main panelboard and at each branch circuit panelboard. Additional spot readings shall be made if required. Resistance of grounding system shall be tested and recorded.

MANUFACTURER'S ASSISTANCE

- A. Qualified technical representatives of manufacturers shall be available to visit the project and provide required assistance for any problems or trouble areas of any systems, material or equipment used in the project. Manufacturer's engineering assistance shall also be available

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for above problems or trouble areas. The Contractor shall purchase all materials, equipment or systems with these services included in the purchase price or otherwise be prepared to have the above service provided when needed or requested by the Engineer without additional compensation. Where one manufacturer's equipment constitutes the majority of the components or devices to make a system, the manufacturer's technically qualified representative shall inspect and accept the completed installation whether or not especially requested by the Engineer.

INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. The Electrical Trade shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the Electrical systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the Electrical systems.

CONSTRUCTION STATUS REPORT

- A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

RECORD OF UNDERGROUND LINES

- A. On completion of the project, the Contractor shall prepare and submit to the Architect-Engineer a drawing on tracing paper and one full-size print to show the location of any underground lines installed in locations different from those on the Architect-Engineer's drawings. The location and the distance from the building to outside lines and manholes shall be dimensioned.

END OF SECTION

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SECTION 26 05 19 - - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

WORK INCLUDED

- A. Wires and Cables, Under 600 Volts.
- B. Connectors and Lugs, Under 600 Volts

RELATED WORK

- A. Division 23 – Mechanical
- B. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- D. Section 26 20 00 – Low-Voltage Electrical Distribution
- E. Section 26 05 53 – Identification for Electrical Systems
- F. Division 27 – Communications
- G. Division 28 – Electronic Safety and Security

REFERENCES

- A. All wire, cables, connectors, and lugs shall be U.L. listed for the application intended and meet NEMA applicable standards.
- B. All wiring methods shall meet with NFPA applicable codes.
 - 1. CONDUCTOR CODING:
- C. Color Code Conductors of 208/120-volt system power and lighting conductors as follows:
 - 1. Neutral White
 - 2. Ground Green
 - 3. Phase A Black
 - 4. Phase B Red
 - 5. Phase C Blue
- D. No. 12 and No. 10 conductors shall have continuous insulation color(s). Color code conductors larger than No. 10 which do not have continuous insulation color by application of at least two

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laps of colored tape on each conductor at all points of access. Tape shall be "Scotch," "Highland," or "Timflex" vinyl plastic electrical tape No. 35 or accepted equal.

- E. Number code all control and instrumentation wiring at all points of access.

CONDUCTOR SIZES

- A. All conductor sizes (AWG) are based on copper.

SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 26 05 00.

PART 2 PRODUCTS

7.01 MANUFACTURERS

- A. All wires and cables shall be as manufactured by General Cable, Capital Wire & Cable, Carol Cable, American Insulated Wire, Southwire, Senator, Rome, Cerro Wire and Cable, Circle Wire & Cable.
- B. All connectors and lugs shall be as manufactured by T & B, Buchanan, 3M, Burndy, or accepted equal.

MATERIALS AND TYPE

- A. Wiring, Power and Control:

- 1. General:

- a. Conductors shall be soft annealed copper unless otherwise indicated.
- b. All conductors #8 AWG or larger shall be stranded (except in surface raceway SR, all conductors shall be stranded).
- c. All power wiring shall be #12 AWG minimum unless otherwise indicated.
- d. All control wiring shall be #14 AWG minimum for NEC Class I and #16 AWG minimum for NEC Class II, extra fine stranding.
- e. All insulation shall be rated for 600 volts unless otherwise indicated.
 - 1) Building Wiring: Conductors shall be type "THWN" or "THHN" unless otherwise indicated. "THHN" shall not be used in damp or wet locations.
 - 2) Underground Wiring (Refer to Part-3 for limitations):
- f. #12 AWG through #6 AWG: Conductors shall be type UF copper cable with heat and moisture resistant insulation, suitable for branch circuit wiring. The cable shall have an insulated equipment grounding conductor. The overall covering shall be flame retardant; moisture, fungus, and corrosion resistant; and limited to use within the pole standard.

- g. #12 AWG through 500 kcmil (MCM) AWG: Conductors shall be type RHH/USE/RHW stranded copper with Durasheath cross-linked polyethylene, thermosetting XLPE, that is heat, fungus, and moisture resistant.
- h. #12 AWG through 500 kcmil (MCM) AWG: Conductors shall be type XHHW-2 stranded copper cable with cross-linked polyethylene, thermosetting XLPE that is chemical and oil resistant, and suitable for wet or dry locations.
 - 1) Flexible Metal Conduit (Liquidtight) Connections and Motor Starter Enclosures: Power and line voltage control wiring Type MTW stranded copper unless otherwise indicated for all motor connections, HVAC equipment, all other equipment subject to movement and vibration, and motor starter enclosures.
 - 2) Flexible Cable:
- i. Shall be hard service cord, type "SO" with equipment ground conductor in addition to normal current carrying conductors, and "safety-yellow" jacket.
- j. Connectors shall be Crouse-Hinds series CG, Appleton, Kellems, O.Z./Gedney, Raco, or T & B, complete with locknut, sealing gasket, gland nut and tapered neoprene bushing.
- k. In hazardous areas, connectors shall be Crouse-Hinds CGBS.

B. Motor Connections:

- 1) Connection lugs shall be Thomas and Betts, Series 54200.
- 2) Insulation shall be motor stub splice insulators, Thomas and Betts, Series MSC, or Raychem MCK.

C. Connectors and Lugs, 600 Volts and Under:

- 1) Material: Copper, or suitable copper alloy, for all current carrying parts and all parts coming in contact with conductors.
- 2) Connectors and Lugs, No. 8 and Larger Conductors: Compression type T & B "Color-Keyed" or accepted equal by Burndy or Kearney. Mechanical compression lugs furnished with equipment are acceptable. Provide insulating covers or heat shrinkable insulators where required.
- 3) Connectors, No. 10 and Smaller Conductors: Permanently indented self-insulated pressure connectors T & B, Buchanan, or accepted equal. Snap-on insulating caps are acceptable insulation. "Scotch-loks" by the 3M Company, "Wing-Nut" by Ideal, "Legrands" by Pass & Seymour (P&S) are acceptable wing type wire connectors.
- 4) Lugs, No. 10 and Smaller Conductors: Permanently indented or compression type by Buchanan, Burndy, T & B, or accepted equal. Washer head screw terminals without lugs are acceptable on neutral bars, circuit breakers, wiring

devices and other equipment, unless otherwise indicated. Mechanical compression lugs furnished with equipment are acceptable.

- 5) Exterior Splices: Compression type T & B "Color-Keyed", complete with T & B Shrink-Kon series HS heat shrinkable insulators or accepted equal by Burndy or Kearney.

PART 3 EXECUTION

9.01 INSTALLATION

- A. Clean out raceway system before pulling wire.
- B. Utilize an approved compound as required to facilitate pulling wires and cables, unless otherwise indicated.
- C. 600 Volts and Under Wiring Methods:
 1. Conductor Ties:
 - a. Inside each enclosure, other than outlet and junction boxes, conductors shall be bundled and trained utilizing T & B "Ty Rap", 3M Brand Cables Ties, Tyton Cable Ties, or accepted equal.
 2. Conductor Sizes:
 - a. Line Voltage Power Wiring: No. 12 AWG minimum. Circuits and feeders larger than 20 amp. to have conductors sized for equal or greater ampacity, than their protective device ratings unless otherwise indicated. All wires for 20 amp. circuits shall be #10 on runs 100 feet to 250 feet, #8 on runs 251 feet to 500 feet and #6 on runs 501 feet and above.
 - b. Control Wiring:
 - 1) 120 Volt: If not carrying motor current, No. 14 AWG unless otherwise indicated, or required by load or distance encountered.
 - 2) Terminal Strips: Where equipment does not have terminal strips, provide terminal strips to terminate and splice control, power limited and communication cables. Indicate wire numbers on strip with indelible pen.
 - 3) Conductor Identification:
 - c. Wire Markers:
 - 1) Identify lighting and receptacle branch circuit wiring by panelboard name and circuit number at all accesses.
 - 2) Identify motor branch circuit wiring by circuit number and phase at all accesses.
 - 3) Identify feeders by name of equipment from which they originate, circuit number, and phase.

- 4) Identify all control wiring with a unique number for each wire.
- d. Color Code: Color code conductors to designate neutral conductor, ground conductor and phase conductors as described in Part 1 of this Section.
 - 1) Splices:
 - e. Feeders: Feeder conductors installed between electrical distribution equipment (i.e., switchboards, transformers, and panelboards) shall be free from splices, no exceptions. Any feeder conductor splices proposed by the Contractor shall be approved in advance by the Engineer; otherwise, they are not permitted.
 - f. No splices shall be made in any conductor beyond the exterior walls of the Building, except in exterior pullboxes, and where approved by the Engineer.
 - 1) Motor Connections: Shall use connection lugs with motor stub splice insulators.
 - 2) Flexible Cable, Type SO: Flexible cable shall be used to connect portable equipment in kitchens, etc., as indicated and limited by the Codes.
 - 3) Each applicable system shall have a separate conduit system unless the applicable system's manufacturer, Codes and Regulations permit other systems conductors to be installed in the same conduit.
 - 4) Type RHH/USE/RHW conductors shall be used for exterior underground lighting branch circuits in schedule 40 PVC conduit. Refer to Section 26 05 43 for the exceptions to the specified complete concrete encasement. Direct burial of the RHH/USE/RHW wire is not permitted. The type UF conductors shall be used within the exterior lighting fixture pole or standard.
 - 5) Type XHHW-2 conductors shall be used for the secondary underground service entrance cables unless otherwise indicated.

END OF SECTION

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SECTION 26 05 23 - - CONTROL VOLTAGE ELECTRICAL POWER CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

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

WORK INCLUDED

- A. Power Limited Shielded Cable

RELATED WORK

- A. Division 23 - Mechanical
- B. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- D. Section 26 20 00 – Low-Voltage Electrical Distribution
- E. Section 26 05 53 – Identification for Electrical Systems
- F. Division 27 – Communications
- G. Division 28 – Electronic Safety and Security

REFERENCES

- A. All wire, cables, connectors, and lugs shall be U.L. listed for the application intended and meet NEMA applicable standards.
- B. All wiring methods shall meet with NFPA applicable codes.
 - 1. CONDUCTOR SIZES
- C. All conductor sizes (AWG) are based on copper.
- D. Number code all control and instrumentation wiring at all points of access.
 - 1. SUBMITTALS
- E. Submit shop drawings and product data in accordance with Section 26 05 00.

PART 2 - PRODUCTS

5.01 MANUFACTURERS

- A. All connectors and lugs shall be as manufactured by T & B, Buchanan, 3M, Burndy, or accepted equal.

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- B. All power limited shielded twisted pair shall be as manufactured by Manhattan, Belden, Alpha, West Penn, Anixter S.

MATERIALS AND TYPE

A. Wiring, Power and Control:

1. General:

- a. All control wiring shall be #14 AWG minimum for NEC Class I and #16 AWG minimum for NEC Class II, extra fine stranding.
- b. All insulation shall be rated for 600 volts unless otherwise indicated.

2. Power limited twisted pair cable (Not for air plenums):

- a. For Remote Control, Signaling and Power-Limited Circuits as per NEC-725 for Class 2 and 3 circuits.
 - 1) General: Cable shall be UL classified for non-conduit application in ceiling void (non-air plenum) in accordance with NEC 725 and for application in multi system common raceway in accordance with NEC 725 and as specified below.
 - 2) Control and Instrumentation (24 volt) (Heating, Ventilating and Air Conditioning): Control and instrumentation (24 volt) shall be the minimum of two (2) #16 twisted pair configuration, insulated stranded tinned copper conductors with 1-1/2 minimum lay, types CL2 or CL3, or riser type cables CL2R or CL3R, as required by Class, insulated, jacket, color coded, 100% aluminum polyester tape shield, #18 AWG tinned copper drain wire or as indicated otherwise herein.
 - 3) Control and Instrumentation (Heating, Ventilating and Air Conditioning): Thermocouple extension wire shall be compatible with the specific thermocouple material and shall have the same features as "(2)", except the wire shall meet ANSI standard MC96.1 (Temperature Measurement Thermocouples) and have proper amount of pairs for the application.
 - 4) Direct Digital Control System: Wiring between pilot relays, sensors, DDC's and control processing unit shall have proper amount of pairs and be the type as required by Digital Control System installed by temperature control system trade, and shall have similar features of "(2)".
 - 5) Other Systems: Wiring on the applicable systems load side shall be gauge, pairs and shield as required by the applicable system's manufacturer and shall have similar features as to "(2)". Provide shield if required by applicable system's manufacturer or Codes.
- b. For Telephone, Outside Wiring for Fire Alarm and Intrusion Detection, Telephone-like Systems Circuits per NEC 800:
 - 1) Cables shall be UL Classified for non-conduit application in ceiling void in accordance with NEC-800 and for application in multi-system common raceway application in accordance with NEC 800.

- 2) Cable features shall be twisted pair configuration, type CM or CMR, color coded, insulated solid tinned copper conductor, insulated jacket, 100% aluminum polyester tape shield complete with tinned copper drain wire. The quantity of pairs, gauge and shielding requirements shall be determined by the applicable system's manufacturer. Provide shield if required by applicable system's manufacturer or Codes.
- c. For Fire Protective Signaling System Circuits per NEC-760:
 - 1) The cable shall be UL Classified for non-conduit application in ceiling void in accordance with NEC 760 and as specified below.
 - 2) Cable features shall be twisted pair configuration, type FPL or riser type FPLR as required, color coded, insulated solid tinned copper conductor, insulated jacket, 100% aluminum polyester tape shield complete with tinned copper drain wire. The quantity of pairs, gauge and shielding requirements shall be determined by the fire alarm system manufacturer. Provide shield if required by the fire alarm system's manufacturer.
3. Terminal Strips shall be 600 volt barrier type with marking strip suitable for marking with indelible pens.
4. Pulling compound shall be U.L. listed.
5. Wire markers shall be wrap-around tags made of shrinkable PVC sleeving with hot-stamped blocks or slip-on beads.

PART 3 EXECUTION

7.01 INSTALLATION

- A. Clean out raceway system before pulling wire.
- B. Utilize an approved compound as required to facilitate pulling wires and cables, unless otherwise indicated.
- C. 600 Volts and Under Wiring Methods:
 1. Conductor Ties:
 - a. All power limited cable shall be bundled and trained for each system in the ceiling voids. Each bundle shall be supported from the structure with proper metallic (Caddy) clamp or hanger at the required distances. Proper type of T & B HalarTM cable ties are permitted for use in air plenums.
 2. Conductor Sizes:
 - a. Control Wiring:
 - 1) 120 Volt: If not carrying motor current, No. 14 AWG unless otherwise indicated, or required by load or distance encountered.

- 2) 30 Volts or Under: No. 16 AWG unless otherwise indicated or required by load or distance encountered.
3. Control and instrumentation wiring specified in Divisions 21 and 22 shall be furnished and installed by Division 26.
4. Control and instrumentation wiring specified in Division 23 shall be furnished and installed as follows:
 - a. All line voltage control wiring, 101 volts, 60 Hertz or higher voltage shall be provided under Division 26.
 - b. All low voltage control raceways and wiring, 100 volts and lower voltages and thermocouple extension wiring, shall be provided under Division 23, according to Section 26 05 33 and Section 26 05 23 product and material requirements, and installation methods.
5. Direct Digital Control System wiring specified in Division 23 shall be furnished and installed as follows:
 - a. All line voltage control wiring, 101 volts, 60 Hertz or higher voltage, wired through the Digital Control System; and 120 volts, 60 Hertz power source wiring to the Direct Digital Control System shall be provided under Division 26.
 - b. All low voltage control wiring (100 volts and lower voltages) for the Direct Digital Control System shall be provided under Division 23, in the manner as noted above for control and instrumentation wiring.
6. Power Limited Shielded Twisted Pair Cable:
 - a. All plenum rated (and non-plenum) shielded power limited cable shall be installed in accordance with NEC Article 725, 760 or 800 on the "load" side of the applicable system.
 - b. Provide proper number, shielding and size of wires as required for operation of the applicable system in accordance with the manufacturer's instructions and applicable NFPA codes.
 - c. Raceway Requirements:
 - 1) Where an accessible ceiling system or demountable partitions are installed; hollow spaces in casework are available; or similar accessible void is available; a conduit system will not be required. If a conduit system is not utilized cables shall be installed using the specified "Open Wire Management" system.
 - 2) Where cable is in inaccessible ceiling voids, in inaccessible wall void, penetrates a floor or wall, or exposed on wall or at ceiling, the cable shall be in conduit.
 - 3) Where partial, detached or "floating" ceilings are provided or no finished ceiling is provided, the cable shall be in conduit, terminating in an accessible corridor ceiling void.

- 4) The above conduits shall terminate in an accessible void and shall be bushed to prevent damage to cable. All conduits shall also be grounded to the BGES.
- d. Wiring splices are to be avoided to the extent possible, and if needed, they must be made only in accessible junction boxes and shall be crimp connected.
- e. Transposing or changing color coding of wires shall not be permitted.
- f. Wire nut-type connections are not acceptable. All connections shall be made on terminal strips (in boxes or cabinets).
- g. All conductors shall be labeled on each end with "E-Z markers" or equivalent.
- h. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal.
- i. Cabinet terminals shall be numbered and coded. All controls, function switches, etc., shall be clearly labeled on all equipment panels.
- j. All connections to components and equipment shall be made with crimp type terminal connections, or method approved by applicable systems manufacturer.
- k. All wiring shall be checked and tested to insure that there are no grounds, opens or shorts.
- l. Ground all shields only at termination point (originating).
- m. If shield is not to be grounded, pull shield back over cable jacket and insulate with heat shrink tubing to prevent accidental grounding.
- n. Install cable connectors on all power limited cables entering enclosures except where cable is in protective conduit.
- o. All cables installed in ceiling voids shall be attached to or supported from a vertical surface, a structural member or electrical conduit with a Caddy flexible cable support, bridle ring or cable clamp; or specified conductor tie (plenum rated where required). Absolutely do not support from ceiling system or fixture support wires except where accessing a ceiling mounted device. The cable(s) shall not block lay-in lighting fixtures, ceiling mounted HVAC equipment or ceiling tiles in order to allow full access to the ceiling void.
7. Terminal Strips: Where equipment does not have terminal strips, provide terminal strips to terminate and splice control, power limited and communication cables. Indicate wire numbers on strip with indelible pen.
8. Conductor Identification:
 - a. Wire Markers:
 - 1) Identify all control wiring with a unique number for each wire.
9. Splices:

- a. No splices shall be made in any conductor beyond the exterior walls of the Building except in exterior pullboxes, and where approved by the Engineer.
 - b. Shielded power limited cable for Digital Control System wiring shall be splice free between sensors, DDC's and central processing unit.
10. Each applicable system shall have a separate conduit system unless the applicable system's manufacturer, Codes and Regulations permit other systems conductors to be installed in the same conduit.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

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.

1.03 WORK INCLUDED

- A. Building Grounding Electrode System (BGES)
- B. Equipment Grounding Conductor (EGC)
- C. Grounding for Data and Telecommunications Systems (TGB)

1.04 RELATED WORK

- A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 26 05 23 – Control Voltage Electrical Power Cables
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- D. Division 27
- E. Division 28

1.05 REFERENCES

- A. NFPA 70 (NEC), Article 250

1.06 DESCRIPTION

- A. The building grounding electrode system shall be in accordance with NEC 250.32 and other applicable NEC Articles. The minimum grounding electrode system shall be a connection to the cold water main valve inside the building or structure, plus a concrete-encased electrode, plus the minimum of three (3) ground rods in a triangular pattern outside the building and the metal frame of the building or structure, where effectively grounded.
- B. An insulated equipment grounding conductor, color coded per section 26 05 19, and the NEC, shall be provided for each alternating current circuit without exception.

1.07 TESTS

- A. The grounding electrode system shall have a resistance of 25 ohms or less as per N.E.C. 250.56. Resistance of the grounding electrode system shall be measured separately, with this system disconnected from the building, using the three-point "fall-of-potential"

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method. Measurements shall be made with appropriate ground resistance meters as manufactured by James G. Biddle; Associated Research, Inc.; or accepted equal.

- B. The equipment grounding conductor shall be tested for continuity and proper bonding to metallic equipment enclosures, outlet boxes, wiring devices and similar items.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Ground Rods: 3/4" X 10' copper-clad steel ground rods as manufactured by Copperweld, "Permaground" stainless steel clad ground rods as manufactured by Teledyne Metal Forming or accepted equal. The copper shall have a minimum thickness of .013 inch at any point on the rod. If necessary to install ground rods deeper than 10'-0", then sectional ground rods shall be installed.
- B. Ground Clamps: Thomas & Betts "GUV," O. Z. Gedney "CG" series or Blackburn "GUV" series, as required by water pipe size and/or grounding electrode conductor size.
- C. Data Room Ground Bus Bar Kits: Isolated grounding bus bars shall be provided in the Main Data Distribution Room or location and at all Data Wiring Closets or Rack/Cabinet Locations. Data grounding bus bar kits shall be by CPI or accepted equal. The main data distribution room or location shall have a telecommunications grounding bus bar (TGB) 2" tall by 10" long by 0.25" thick pre-drilled copper bus bar with isolators and mounts (CPI #10622-010) & (CPI #10622-000).

PART 3 EXECUTION

3.01 INSTALLATION

- A. The service to the new terminal building which includes the service entrance conductors and raceways and service equipment shall be provided with a Building grounding system and grounded in accordance with the requirements of the National Electrical Code.
- B. Multiple-Rod Grounding Electrode System: The ground rods and ground grid system shall be of adequate design sufficient to allow for seasonal changes in soil characteristics and possible corrosion of the ground system by the soil, and shall be installed in virgin, undisturbed soil. Multiple-rod grids should be arranged in either a triangular arrangement or in a "hollow square" if of more than 3 rods, with spacing between adjacent rods not less than the average depth of the rods in the system. If the soil has been disturbed, either by the present construction or previous occupancies, then the ground rods shall be deep-driven, so that there shall be a minimum length of 10 feet in undisturbed soil.
- C. Ground conductors shall be connected to the ground rod(s) by exothermic welding as manufactured by:
 - 1. "Cadweld" process by Erico Products, Inc., or
 - 2. The "ThermOweld" process by Continental Industries Inc.
- D. Equipment Grounding Conductor (EGC):

1. Provide a separate insulated grounding conductor, color-coded as per Section 26 05 19, enclosed in the same raceway with the phase conductors for all alternating current circuits, even though not necessarily shown on the drawings.
2. The equipment grounding conductor shall be secured to the equipment enclosure at the source of power and at the apparatus being served by the alternating current supply.
3. The minimum size for the grounding conductor shall be as specified in Table 250.122 of N.E.C.

E. Data Room Ground Bus Bars:

1. Provide a separate insulated grounding conductor (#2 AWG) between the main data distribution room grounding bus bar to the BGES.
2. Coordinate exact location and installation with the Division 27 Trade prior to rough-in and installation.

END OF SECTION

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SECTION 26 05 33 - – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
- B. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- C. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- D. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

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.

1. WORK INCLUDED

- B. Rigid Conduit (Heavy Wall, Intermediate Metal Conduit, Electrical Metallic Tubing and Rigid Non-Metallic Conduit)
- C. Flexible Conduit (Liquidtight and "Greenfield")
- D. Surface Raceway (SR) and Wireway
- E. Fittings for Conduits, Flexible Metal Conduit, Surface Raceway (SR), Wireway.
- F. Pull Boxes
- G. Junction Boxes
- H. Outlet Boxes
- I. Exterior Pullboxes
- J. Multi-Service Recessed Floor Boxes

1. RELATED WORK

- K. Section 26 05 53 – Identification for Electrical Systems
- L. Section 26 20 00 – Low-Voltage Electrical Distribution
- M. Section 26 27 26 – Receptacles
- N. Section 26 50 00 – Lighting
- O. Division 27 – Communications

P. Division 28 – Electronic Safety and Security

1. SUBMITTALS

Q. Submit shop drawings and product data in accordance with Section 26 05 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Rigid Heavy Wall Conduit (GRS): Essex, Allied Tubing, Republic, Steelduct, Triangle, L.T.V., Wheatland, or accepted equal.
- B. Intermediate Metal Conduit (I.M.C.): L.T.V., Berger Industries, Inc., Allied Tubing, or accepted equal.
- C. Electrical Metallic Tubing (E.M.T.): L.T.V., Wheatland, Republic, Steelduct, Berger Industries, Inc., or accepted equal.
- D. Rigid Non-Metallic Conduit: Carlon "PLUS" Schedule 40, 90°C, U.L. listed, Queen City Plastics, Sedco, Can-Tex Industries, or accepted equal.
- E. Liquidtight Flexible Metal Conduit: Anaconda "Sealtite", O.Z./Gedney "Flex-Guard", Electri-Flex Co. "Liquid-Tight", or accepted equal.
- F. Galvanized Single Strip Steel Flexible Conduit: American Flexible Conduit, Anaconda, Electri-Flex Co., or accepted equal.
- G. Fittings (All fittings to be same materials as specified for conduit):
 - 1. Rigid Heavy Wall and Intermediate Metal Conduit Fittings: O.Z., T & B, Efcor, Berger Industries, or accepted equal.
 - 2. Electrical Metallic Tubing Fittings: T & B, Raco, Steel City, O.Z./Gedney, Berger Industries, Inc. or accepted equal.
 - 3. Flexible Metal Conduit Fittings: T & B, O.Z./Gedney, Midwest, Steel City, or accepted equal.
 - 4. Conduit "L's": Crouse Hinds, Killark, O.Z./Gedney, Shamrock Conduit Products, or accepted equal.
 - 5. Cable Supports: O.Z. type M or accepted equal.
 - 6. Underground Raceway Seals: O.Z., Spring City Electrical MFG., or accepted equal S.
 - 7. Fire Wall and Smoke Partition Seals:
 - a. O.Z. type CFS fire seals or T & B "Flame Safe" Fire Stop System or 3M Brand Fire Barrier Penetration Sealing System #7904, 3M Brand Fire Barrier Caulk CP-25 and Putty 303, Nelson "Flameseal" fire stop putty, or accepted equal for each conduit or cable as required S.

8. Rigid Non-Metallic Conduit Fittings: Carlon, Queen City Plastics, Sedco, Can-Tex Industries, or accepted equal.
 9. Insulated Throat Metallic Bushings: O.Z./Gedney Type B or BLG, T & B nylon insulated metallic, or acceptable equal by Efcor. Provide grounding lug type where required.
- H. Wireway: Square D or equal by Walker, or Hoffman.
- I. Surface Raceway: Surface metal raceway and fittings shall be by the Wiremold Co. or acceptable equal by Hubbell S.
- J. Pull and Junction Boxes: General Metals, Electromate Mfg. Corp., Hoffman, or accepted equal.
- K. Outlet Boxes: Appleton, Raco, Steel City, or accepted equal.
- L. Outlet Box Brackets: E-Z Mount Bracket Co., Inc., Vinton, Virginia 24179, or accepted equal by Caddy, Raco.
- M. Multi-Service Floor Boxes: Wiremold, Inc., or accepted equal S.
- N. Exterior Pullboxes: Quazite Corporation, Blackburn-Weaver, Bell, Perfect-Line, O.Z./Gedney, Carlon, or accepted equal S.

1. MATERIALS AND USE

- O. Rigid Heavy Wall Conduits (GRS): Of mild steel tube, electro or hot-dipped galvanized and U.L. labeled.
- P. Intermediate Metal Conduit (I.M.C.): Of mild steel tube in sizes 3/4" to 4", hot-dipped galvanized or electro-galvanized and U.L. labeled. Refer to limitations under Part 3 - EXECUTION.
- Q. Electrical Metallic Tubing (EMT): Of mild steel tube in sizes 3/4" to 4" hot-dipped galvanized or electro-galvanized and U.L. labeled. Refer to exceptions under Part-3.
- R. Flexible Metal Conduit:
1. Liquidtight flexible metal conduit: Flexible galvanized steel tubing covered with extruded liquid-tight jacket of PVC and a continuous copper bonding conductor wound spirally between the convolutions. Refer to limitations in Part 3 - EXECUTION.
 2. Galvanized single strip steel flexible conduit (Commercial Greenfield): UL 1 listed. Refer to limitations in Part 3 - EXECUTION.
- S. Rigid Non-Metallic Conduit: Schedule 40 PVC (polyvinyl chloride) conduit that meets and exceeds UL 651, NEMA TC 2-1978 for above ground, direct burial, concrete, and exposed applications. Refer to limitations in Part 3 - EXECUTION.
- T. Fittings:
1. For Rigid and Intermediate Conduit: Couplings to be galvanized or sheradized steel. Double galvanized steel locknuts shall be used where required by code. Single locknut and bushing may be used elsewhere. Insulated throat metallic bushings to be

installed on all rigid conduit terminations where such bushings are required by NEC to protect the wires from abrasion. Use ground lug type where required.

2. For E.M.T.: Steel set screw connectors, permanently indented or gland compression type. Do not use cast metal type.
3. For Flexible Metal Conduit: Standard liquidtight fittings for liquidtight conduit. Standard steel flexible metal conduit fittings for standard flexible metal conduit.
4. Conduit "L's": Galvanized steel, threaded, "LB" or "LBD".
5. Cable Supports: To be installed for the support of all conductors and cables as per NEC Article 300-19.
6. Underground Raceway Seals: Provided on each underground electrical raceway entering building. Provide type "FSK" "thruwall" seals on each conduit passing through the outside wall or floor. Provide type CSBG conduit sealing bushing on each underground conduit at the first pullbox, panel or other location as noted on drawings.
7. Fire Resistance Rated Wall and Smoke Partition Seals:
 - a. Provide fire-seals for each conduit or cable passing through fire rated walls and floors where the floor, wall or smoke partition has a rating up to three (3) hours in accordance with Manufacturer's application data. All penetration systems shall have been tested per ASTM B14-88 fire test and UL listed for "Through-Penetration Fire Stop System".
8. For Rigid Non-Metallic Conduit: PVC fittings, elbows and cement shall be provided by the same manufacturer who provides the rigid non-metallic conduit.
9. Conduit Expansion Joints: O.Z. mechanical type, or accepted equal, on each conduit run crossing building expansion joint, except where loops as described below may be used. Where 1" and smaller raceways are run concealed in open ceiling space, an expansion loop connecting two outlets on opposite sides of the building expansion joint may be installed in lieu of the conduit expansion joint. A raceway crossing the joint and having a 3 ft. section parallel to the building expansion joint and free to move will suffice.

U. Surface Raceway:

1. The raceway shall consist of a base and cover section factory assembled and designed to accommodate pulling conductors through the raceway. Raceway shall be U.L. labeled.
2. The base section shall have a nominal material thickness of .040" and be manufactured of zinc plated or galvanized steel.
3. The cover section shall have a nominal material thickness, as listed below, and be painted with a baked enamel finish which is capable of being over-painted in the field if required.
 - a. Mark Series Cover Thickness
 - 1) SR2 Wiremold 200 .025"

- 2) SR5, SR7 Wiremold 500, 700 .040"
 4. Raceway dimensions shall be as follows:
 - a. Mark Series Dimensions
 - b. SR2 Wiremold 200 ½" W x 11/32" H
 - c. SR5 Wiremold 500 ¾" W x 17/32" H
 - d. SR7 Wiremold 700 ¾" W x 21/32" H
 5. Fittings:
 - a. General: A full complement of fittings must be available including, but not limited to, bushings to prevent wire abrasion, single and multiple gang boxes to accommodate device installation, adapters from conduit to raceway, transitions to both larger and smaller surface metal raceways, receptacle covers, wiring device brackets, take-off connectors, pre-wired receptacle harnesses, 90 degrees elbows, tees, fixture boxes and flexible sections to allow uninterrupted continuation of raceway along semi-circular or curved surfaces.
 6. Refer to limitations under PART 3 - EXECUTION.
- V. Wireway:
1. Wireways shall be listed to meet UL 870.
 2. Wireway covers and troughs shall be constructed from a minimum of 14 gauge steel before finishes are applied. The end flanges shall be constructed from ten gauge steel. All lengths and fittings shall have smooth, rounded edges to prevent damage to wire and cable insulation. Wireway shall be furnished without knockouts.
 3. Wireway covers shall have oil-resistant closed cell gasketing for sealing purposes. A solid oil-resistant neoprene joint gasket shall be used between flanges for rigidity when sections and fittings are bolted together.
 4. A gasketed captive hinged connector which interlocks with the covers shall be used at each joint. The connector shall be such that the covers cannot be closed and latched without closing the sealing connector.
 5. Wireway shall be provided with quick-release cover latches which hold the cover securely in place when closed. Latches shall have provision for a sealing wire to be used when covers and latch are in the closed position.
 6. Wireway covers shall be secured to the troughs with leaf type hinges which all allow full opening access to the wireway interior.
 7. Provide NEMA-1, NEMA-3R, NEMA-4X, NEMA-12 or other NEMA enclosure where required by NEC or environmental conditions.

- W. All boxes to be sheradized or galvanized (after fabrication) sheet steel (except floor boxes) code gauge boxes.
- X. The minimum size of all boxes shall conform to the requirements of the National Electrical Code, unless noted to be larger on the drawings, and shall have adequate braces and supports.
- Y. Pull and Junction Boxes: All boxes shall have screw-on or hinged covers. All flush mounted boxes shall have 3/4" overlapping covers with flush-head cover retaining screws and covers in finished areas shall be prime coated with paint.
- Z. Outlet Boxes:
 - 1. All boxes shall have ears turned in. Multiple gang boxes must be one piece type (not built-up). Provide 3/8" (or larger if required) fixture stud in all fixture boxes. Provide appropriate covers as required, including 3/4" deep plaster ring covers where plaster may be encountered. Provide vapor proof outlet boxes for vapor proof fixtures. Provide size and type of boxes as required by location and N.E.C., except where exposed masonry occurs, use one piece "tile boxes". All boxes shall be 4" square boxes with "tile rings" unless noted otherwise or where larger sizes are required. All outlet boxes requiring hangers shall be hung with metal hangers.
 - 2. All exposed boxes below ceiling level shall be cast type FS or FD.
- AA. Stud Wall Outlet Box Brackets: Provide #E-Z 1-4, #E-Z 4-1116 or #E-Z 23-1 outlet box brackets with extension brackets or acceptable equal.
- BB. Outlet Box Bar Hangers: Provide adjustable or solid bar metal hangers by Appleton Electric Manufacturing or accepted equal.
- CC. Exterior Pullboxes: Provide reinforced polymer concrete service box, extension, and cover with proper logo with a minimum of 7.4 cubic feet of interior space unless otherwise indicated and meets ASTM D-756, D-543, D-570, D-790 and D-365 test requirements.
- DD. Multi-Service Recessed Floor Boxes (FB): Walker Inc., #RFB4-CI-1, cast iron recessed four (4) compartment combination box complete with combination wire tunnel/mounting bracket, two (2) internal duplex receptacle brackets as required, internal blank brackets as required, telephone/data brackets as required (Contractor to match telephone and data jacks' specification), flush access hatch with floorport flanged activation kit consisting of die-cast aluminum trim ring in finish color selected by Architect and insert areas for carpet or tile cutouts to match surrounding finish, or doors with 1" conduit openings for furniture feeds, as required. Box assembly shall meet UL 514 scrub water exclusion requirements in areas where hard floors are encountered, and in areas where scrub water is anticipated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide raceway systems to achieve required distribution, switching and circuit control. All wires for all systems shall be installed in rigid metal raceways and terminated in boxes or cabinets, unless otherwise specified herein as partial conduit or non-conduit installation. Allow

for making connections to all outlets, motors, etc., indicated and check plans to insure that all outlets, etc., have a designated circuit. Notify the Engineer of any discrepancies found.

- B. Conduit runs are not shown on the drawings, unless specifically noted or indicated otherwise.
- C. Conceal all raceways except where specifically noted on drawings or permitted as exposed. Runs in mechanical room areas may be exposed. Exposed conduit must be run parallel with the building walls and supported in a neat substantial manner. Refer to surface raceways under PART 3 - EXECUTION. Installation of exposed conduit in any finished areas must be approved in advance by the Architect.
- D. Cap raceway systems during course of construction and thoroughly clean inside before installation of conductors.
- E. No rigid raceway for line voltage wiring shall be smaller than 3/4", except for flexible conduit, unless specifically indicated otherwise. The Electrical Trade shall size all other raceways based on the N.E.C. and verify the sizes shown on the drawings, increasing same if required by local authorities and/or codes.
- F. All conduit feeding from one building area to another shall remain within the confines of the building, unless shown or noted otherwise on the drawings.
- G. Field made conduit bends shall be made with an acceptable bending machine or conduit bender.
- H. Flexible Metal Conduit:
 - 1. Liquidtight flexible metal conduit cannot be used in an air plenum ceiling void. Standard galvanized single strip steel flexible conduit shall be used in air plenum ceiling void.
 - 2. Flexible metal conduit for all flexible connections, all short motor connections and all equipment subject to movement or vibration and where permitted by the Engineer. Liquidtight flexible metal conduit shall be used in exterior applications and all interior wet locations.
 - 3. Flexible metal conduit may also be used as the flexible connection to recessed lighting assemblies.
 - 4. Flexible conduit shall be limited to 6' maximum length and shall be installed in accordance with all requirements of the N.E.C.
- I. Rigid Metal Heavywall Conduit (GRS):
 - 1. All joints shall be properly threaded and made tight in standard conduit couplings.
 - 2. All thread conduits or nipples are not acceptable.
 - 3. All conduit cuts shall be square, made with a hacksaw or approved cutting machine, and reamed after threading and before installation to remove burrs.

4. All threads, both field-cut and factory-cut, not otherwise protected, shall be painted after installation with two coats of asphaltum paint if concealed and two coats of primer base paint if installed in an exposed location.
 5. GRS shall be used in service entrance raceways where exposed.
 6. Clamps to be malleable two (2) hole galvanized iron and hangers to be rod type steel.
- J. Where conduits are exposed to occupants, up to 8'-0" feet above the floor, the conduits shall be snug to the wall and secured with two (2) hole clamps.
- K. Intermediate Metal Conduit (IMC):
1. Applicable specifications for installation of rigid metal conduit applies to IMC.
 2. IMC can be substituted for GRS per the NEC.
- L. Electrical Metallic Tubing (EMT):
1. Applicable specifications for installation of rigid metal conduit applies to E.M.T.
 2. E.M.T. shall not be used underground, cast in concrete, exposed on exterior of buildings, and exposed interior locations below 8'-0" (above finished floor).
 3. E.M.T. may be routed down exposed interior walls to top of panelboards, motor starters, disconnect switches, light switches, etc.
 4. E.M.T. is permitted in electrical and mechanical equipment rooms.
- M. Rigid Non-Metallic Conduit (PVC):
1. All elbows and nipples to be same material as specified for conduit.
 2. All joints to be solvent welded in accordance with conduit manufacturer's instructions.
 3. Hanger clamps to be PVC coated malleable iron and hangers to be PVC coated rod type steel.
 4. Conduit clamps to be PVC coated, two hole clamps complete with nylon hardware.
 5. PVC conduit shall be limited to the following applications:
 - a. Underground secondary service entrance conduits outside the perimeter of the building and routed under the concrete floor slab on grade to the service entrance equipment.
 - b. Underground branch circuit and feeders (under 600 volts), telephone, fire alarm, sound system, control conduits outside the perimeter of the building and in or under the concrete floor slab on grade. The PVC conduit can be routed from the concrete floor slab on grade directly into the masonry unit wall cavities, metal wall stud cavities up to the first wall box only, maximum 4' aff. PVC shall not be exposed within the building except if within a floor mounted enclosure or panelboard to floor conduit enclosure. The PVC conduits under a concrete floor slab on grade will not require

concrete encasement if the slab is more than 2-1/2" thick. Exposed PVC conduit stubs above the concrete slab shall not be permitted. Only exposed rigid metal conduit stubs are permitted.

- c. Underground branch circuit and feeders (under 600 volts) for outdoor lighting only.
- 6. PVC shall not be acceptable in areas where subject to ambient temperatures exceeding those for which PVC conduit is approved, for the support of fixtures or other equipment and other areas not permitted by Codes.
- N. Supports: Provide metallic supports as required for the proper installation of the raceway or conduit systems and all other equipment installed under this contract. Wire shall not be used to support or tie down any conduit system.
- O. Empty Conduits: Pull #12 stranded gauge galvanized fishing wires or stranded nylon line through all empty conduits for all systems. These wires or lines to remain in the conduits.
- P. Exposed Masonry: Where wall finish is exposed masonry, raceways shall be so placed in wall that the masonry unit can be neatly set around it with minimum cutting and without injury to the exposed masonry face.
- Q. Wireways:
 - 1. Furnish and install a complete lay-in wireway system where required. Wiring capacity shall be determined by NEC unless larger dimensions are indicated.
 - 2. Wireway lengths and fittings shall be securely bolted together with same size slotted paint cutting hex-headed shoulder bolts and hex nuts with captive external tooth lock washers which maintain electrical ground continuity across the joint. Each joint shall be gasketed between end flanges. The sealing cover connector shall be installed so as to be held captive and maintain the lay-in ability of the wireway.
 - 3. Wireway shall be installed in accordance with the National Electrical Code requirements.
 - 4. Wireways shall be supported at intervals not exceeding five feet unless specially approved for supports at greater intervals. The ten-foot straight sections of wireway shall be Underwriters Laboratories, Inc. listed for support at ten-foot intervals.
- R. Surface Raceway:
 - 1. Install surface raceway in accordance with manufacturer's recommendations and instructions. Raceway capacity shall be determined by NEC unless larger capacity is indicated.
 - 2. Surface raceway systems shall be limited to the applications and locations indicated on drawings.
 - a. Where approved in advance by the Architect.

- S. All underground conduits including in grade and under floor slabs shall be watertight over the entire length, to prevent entry of water at connections. Provide compatible sealants for material encountered.
- T. All conduits installed under the concrete slab shall be completely underneath the concrete slab. Care shall be taken to ensure that no part of the conduit is within the concrete slab.
- U. Pull and Junction Boxes: Provide all necessary pull and junction boxes where indicated or required by National Electrical Code. Certain pull and junction boxes may be shown on the drawings for specific design reasons but is not to preclude the fact that additional boxes will be required to conform to codes and good practice.
- V. Outlet Boxes:
 - 1. General: All outlet boxes shall be set flush or set to meet the N.E.C. requirements; otherwise box extensions shall be installed. Mounting heights of all outlets shall be as indicated on the drawings, specified herein, or as permitted on the job. Support all boxes to maintain alignment and rigidity. Clean boxes of all foreign matter prior to installation of wiring and/or devices. Adjacent outlet boxes shall be aligned horizontally at the same height, or vertically in the same line, as required.
 - 2. Wall Outlets:
 - a. Where the outlet boxes are shown back-to-back in the walls of 6" or less in thickness, the boxes shall be offset horizontally. Through-the-wall outlet boxes shall not be permitted. Outlet boxes, indicated to be installed side-by-side in the same wall, shall be located 6" apart. All boxes shall be rigidly secured in the wall.
 - b. Steel Outlet boxes in fire walls and fire separation assemblies shall be installed in accordance with Virginia USBC 704.1.1 and 714.1.6.1 respectively. Therefore outlet box openings cannot exceed 16 square inches per outlet with 100 square inches limit per 100 square feet of wall area. Where outlet boxes are shown in opposite sides of the wall or assembly, the boxes shall be separated by a horizontal distance of not less than 24 inches.
 - 3. Exposed Masonry: The outlet boxes shall be placed in the wall to allow the masonry unit to be neatly set around the box, with the minimum of cutting and without injury to the exposed masonry face. The dimensioned heights of the outlets in the exposed masonry walls are intended to mean to the nearest masonry joint.
 - 4. Stud Walls: The outlet boxes shall utilize the wall brackets and extensions as required. The Electrical Trade shall coordinate with the dry wall or plaster lathe installation trade for fastening the outboard part of bracket to prevent any movement of the outlet box within the wall cavity.
 - 5. Floor Outlets: Outlets that are indicated to be installed side by side in the floor shall be located 3" apart.
 - 6. Ceiling Outlets: All flush mounted ceiling outlet boxes shall be supported by adjustable or solid bar metal hangers or directly supported by threaded steel rods or stud type fasteners.

- W. Conduit Termination: All rigid heavy wall metal conduit and I.M.C. shall terminate with locknut and bushing, or locknut and grounding bushing in all boxes, cabinets, panels, etc.
- X. Exterior Pullboxes: Install flush with finished grade on a minimum of tamped 6" gravel base.
- Y. Multi-Service Recessed Floor Boxes: Install flush with finished covering or floor. Where the box penetrates to floor depth, coordinate with related trades for additional support. The following is a description of the outlets/jacks to be installed in each type of floor box.
1. Type A:
 - a. Two (2) duplex NEMA 5-20R receptacles.
 - b. Two (2) blank outlets for Future Use. Provide 1-1/4" empty conduit from each blank outlet to stub up in IT Room 110.
 2. Type B:
 - a. Two (2) duplex NEMA 5-20R receptacles.
 - b. One AV OUTLET WITH 1. Provide 1-1/4" empty conduit from outlet to stub up to the TV location on wall.
 - c. One (1) blank outlet for Future Use. Provide 1-1/4" empty conduit from outlet to stub up in Storage/IT Room 110.

END OF SECTION

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SECTION 26 05 34 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

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.

1.03 WORK INCLUDED

- A. Empty conduit system for Communications Systems provided by Owners Contractor.

1.04 RELATED WORK

- A. Section 26 05 00 – Common Work Results for Electrical
- B. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- D. Section 26 05 35 – Pathways for Electronic Safety and Security System
- E. Section 26 05 53 – Identification for Electrical Systems
- F. Division 27

1.05 GENERAL OPERATION AND DESCRIPTION

- A. General: An empty conduit system shall be provided for the Owners communications systems wiring including data network/IP telephone, audio/video systems, etc.
- B. The raceway for such systems shall be furnished and installed by the Division 26 electrical contractor. All work shall be coordinated with the Owners contractor who will have responsibility for the installation of the communication systems wiring and equipment.
- C. Division 26 shall provide all 120 volt power sources required to support these Communications systems.

1.06 REFERENCES

- A. The complete installation, including additions and modifications, shall be in accordance with:
 - 1. National Electrical Code Article 800.
 - 2. Minimum standards of Electronics Industries Association (EIA).

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: The Division 26 Contractor shall provide all conduit, junction boxes, outlet boxes, and materials required for the installation of empty conduit Communications Systems where required. Any material and/or equipment necessary for the proper operation of the system not specified or described herein shall be deemed part of this specification.
- B. Wiring:
 - 1. Conduit Raceway System: All wiring methods (conduit only) shall be in accordance with NFPA 70, Article 800, and all other codes specified herein, and Section 26 05 33.
 - 2. Communications Raceway System: Provide empty raceway system for communication systems outlets with conduit, boxes, etc., as shown. Outlets, raceways and plates as specified in other Division 26 sections. All conduit runs to have long sweep radius elbows; condulets not permitted. There shall be a maximum of two 90° bends between outlets. Any run over 100'-0" in length shall have a pull box. Provide pull strings and leave in conduit as specified in 26 05 33.
 - 3. Outlet boxes shall generally be as given in the Electrical Symbol List on Sheet E0.01.
 - 4. Furnish and install a 1" conduit (or greater if specified, shown differently elsewhere in the contract documents, or instructed) from each outlet to the system headend location.
 - 5. All communications systems conduits, boxes, etc., shall be properly bushed and grounded.
 - 6. Division 26 shall provide the fire seals and fire-stopping at all fire-rated walls, ceilings, and partitions for the Communication System conduits.
 - 7. Provide a blank coverplate on any unused outlets after the installation of the systems by Division 27 is complete.
 - a. All boxes, conduits, etc., shall be of proper size, as determined by the Division 27 contractor and shall be clearly marked for easy identification.
 - b. Provide all 120 volt power wiring to serve communication equipment as required by the equipment installer. Any 120V power not specifically shown on the drawings shall be taken from the next available spare circuit in the nearest panelboard.
 - c. Coordinate all work with the Division 27 contractor. Division 26 shall coordinate a meeting with the Division 27 contractor to discuss the requirements prior to beginning work.

END OF SECTION

SECTION 26 05 35 - PATHWAYS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

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.

1.03 WORK INCLUDED

- A. Empty conduit system for Electronic Safety and Security Systems provided by the Owners security Contractor.

1.04 RELATED WORK

- A. Section 26 05 00 – Common Work Results for Electrical
- B. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- D. Section 26 05 34 – Pathways for Communications Systems
- E. Section 26 05 53 – Identification for Electrical Systems
- F. Division 28

1.05 GENERAL OPERATION AND DESCRIPTION

- A. General: An empty conduit system shall be provided for electronic safety and security systems including, video surveillance, intrusion detection, etc.
- B. The raceway for such systems shall be furnished and installed by the Division 26 electrical contractor. All work shall be coordinated with the Division 28 installers for these systems who will have responsibility for the installation of the electronic safety and security systems wiring and equipment.
- C. Division 26 shall provide all 120 volt power sources required to support Electronic Safety and Security systems.

1.06 REFERENCES

- A. The complete installation, including additions and modifications, shall be in accordance with:
 - 1. National Electrical Code Article 800.
 - 2. Minimum standards of Electronics Industries Association (EIA).

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Division 26 shall provide all conduit, junction boxes, outlet boxes, and materials required for the installation of Electronic Safety and Security Systems where required in accordance with the specifications and drawings. Any material and/or equipment necessary for the proper operation of the system not specified or described herein shall be deemed part of this specification.
- B. Wiring:
1. Conduit Raceway System: All wiring methods (conduit only) shall be in accordance with NFPA 70, Article 800, and all other codes specified herein, and Section 26 05 33.
 2. Electronic Safety and Security Raceway System: Provide empty raceway system for Electronic Safety and Security systems outlets and devices with conduit, boxes, etc., as shown. Outlets, raceways and plates as specified in other Division 26 sections. All conduit runs to have long sweep radius elbows; condulets not permitted. There shall be a maximum of two 90° bends between outlets. Any run over 100'-0" in length shall have a pull box. Provide pull strings and leave in conduit as specified in 26 05 33.
 3. Outlet boxes shall generally be as given in the Electrical Symbol List on Sheet E0.01. However, the requirements of each outlet shall be coordinated with Division 28 prior to installation.
 4. Furnish and install a 3/4" conduit (or greater if specified, shown differently elsewhere in the contract documents, or instructed by Division 28) from each device back to the system headend or other location called out on the drawings.
 5. All electronic safety and systems conduits, boxes, etc., shall be properly bushed and grounded.
 6. Division 26 shall provide the fire seals and fire-stopping at all fire-rated walls, ceilings, and partitions for the Electronic Safety and Security System conduits.
 7. Provide a blank coverplate on any unused outlets after the installation of the systems by Division 28 is complete.
- C. All boxes, conduits, etc., shall be of proper size, as determined by the Electronic Safety and Security System provider and shall be clearly marked for easy identification.
- D. Provide all 120 volt power wiring to serve communication equipment as required by the equipment installer. Any 120V power not specifically shown on the drawings shall be taken from the next available spare circuit in the nearest panelboard.
- E. Coordinate all work with the Division 28 contractor. Division 26 shall coordinate a meeting with Division 28 to discuss the requirements prior to beginning work.

END OF SECTION

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SECTION 26 05 43 - UNDERGROUND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

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.

1.03 WORK INCLUDED

- A. Underground Power and Communication Raceways

1.04 RELATED WORK

- A. Section 26 05 00 - Common Work Results for Electrical
- B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
- C. Section 26 05 23 - Control Voltage Electrical Power Cables
- D. Section 26 05 26 - Grounding and Bonding for Electrical Systems
- E. Section 26 05 53 - Raceway and Boxes for Electrical Systems
- F. Division 27 - Communications
- G. Division 28 - Electronic Safety and Security

1.05 REQUIREMENTS

- A. Standards:
 - 1. National Electric Safety Code (NESC)
 - 2. Applicable AASHTO specification and testing for precast manholes.
 - 3. National Electrical Manufacturers Association (NEMA)
 - 4. American National Standards Institute (ANSI)
 - 5. Local Electric Utility Company Regulations
 - 6. NFPA 70

1.06 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 26 05 00.
 - 1. Product Data: Submit application, technical and installation data.

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PART 2 PRODUCTS S

2.01 MANUFACTURERS

- A. Underground Marker Tapes: Seton Metallic Detection Tapes, Panduit Underground Hazard Tape, Thomas & Betts, Ideal.

2.02 MATERIALS

- A. Underground Marker Tapes (unless otherwise indicated):
 - 1. Electric: Seton 37223 6" x 1000' metallic underground detection tape or similar by Panduit "HTU" series or Thomas & Betts #0700 series with proper logo and red background.
 - 2. Telephone and CATV: Seton 45385 6" x 1000' metallic underground detection tape or similar by Panduit "HTU" series or Thomas & Betts #0700 series with proper logo and orange background.

PART 3 EXECUTION

3.01 EXCAVATION, BACKFILLING, BEDDING AND RESEEDING

- A. See Division 31 for other excavation, backfilling, bedding and reseeding requirements.

3.02 EXCAVATION

- A. Perform all excavation of every description and of whatever substance encountered to the depths required for installation of the work as indicated on the drawings or specified herein. The amount of trench opened at one time shall not exceed 200 feet including the backfilled portion of any trench which is not in condition for traffic. All excavated materials not required, or which are not suitable for backfill, shall be removed by the Contractor. Shoring shall be provided as necessary to protect existing facilities, new work, and the safety of personnel. Sheathing for conduit trenches shall be left in place at the Contractor's expense. Provide cofferdams or other structures required for construction at no additional cost.
- B. Trenches shall be necessary width for the proper laying of the conduits as nearly vertical as practicable. Trench width at the top of the conduit shall not exceed 8 inches on either side of duct bank. In rock excavation, the rocks shall be removed to a minimum of 6 inches from the sides of the duct bank. Trenches shall be excavated to a depth of 4" below the normal conduit depth except where rock, shale or other hard material is encountered. Where rock, shale or other hard material is encountered, the trench shall be excavated to a depth of 4" below normal conduit depth. Care shall be taken not to excavate below the depths indicated. Unauthorized overdepths shall be backfilled with No. 10 (Virginia size) aggregate stone to levels previously specified. Whenever wet or otherwise unsuitable soil that is incapable of properly supporting the underground conduit is encountered in the bottom of the trench, such soil shall be removed to the depth required as determined by the Engineer and the trench backfilled to the proper grade with material as specified above for over depth.
- C. Trenches shall be of a depth that will provide a minimum 24" cover from top of conduit to finished grade, as hereinbefore stated, unless otherwise indicated.

- D. Excavation for Appurtenances: Excavation for pullboxes and similar appurtenances shall be sufficient to leave at least 12 inches in the clear between their outer surfaces and the embankment or shoring. Final earth supporting elevations shall be of bearing capacity for loads encountered. Rock and over depth shall be treated same as described for trench excavation. Pullbox lid and frame shall be flush with finished grade.

3.03 INSTALLATION

- A. Installation of Underground Non-Metallic Raceways: PVC type 40 conduit, laid to true alignment and uniform grades. All bends to have exactly the right curvature and have regular tapered joints. Where connecting to pull boxes, use a bell end. Loose dirt in the bottom of the trench shall be well tamped previous to placing of conduit. Joints shall be staggered at least 6 inches and the tapered ends shall be given an application of solvent cement for PVC conduit to insure a good joint between the conduit and sleeve coupling. Conduit shall be thoroughly cleaned before installation. During construction and after the conduit line is completed, the ends of the conduits shall be plugged. Care shall be taken to keep conduits clean of concrete, dirt, and any other substance.

3.04 BEDDING AND BACKFILLING

- A. Underground conduit trenches shall be accurately graded to the conduit level and thoroughly compacted as specified hereinafter. Trenches shall be backfilled, thoroughly haunched and tamped. Settling the backfill with water will not be permitted. The surface shall be graded to reasonable uniformity and mounded over trenches.
- B. The precast manhole shall be accurately graded and bedded with No. 10 crushed stone to the
- C. Compacted Backfill: All backfill material used in trenches under paved or future paved areas shall be classified as "compacted backfill". Backfill materials shall be approved excavated material, or other select material, as approved by the Engineer, free from large clods of earth, cinders, ashes, refuse, vegetable or organic matter, and rocks or stones over 1" dimension. Backfill from this duct bank to the top of the trench shall be placed in 6 inch layers and compacted to prevent future settlement. Methods and materials used in backfilling shall be provided to obtain 95 percent of maximum density at optimum moisture as determined by AASHTO Standard T99, and as sufficient to prevent settlement of the pavement or surface.
- D. Normal Backfill: For all backfill not under paved or future paved areas, backfill material shall be free from cinders, ashes, refuse, vegetable or organic matter, boulders, rocks or stones over 3" dimension. Backfill shall be placed and compacted in 6 inch layers to one foot above the top of the duct bank. The remainder of the backfill shall be placed in one foot layers and tamped.
- E. The Contractor shall supply the backfill material as specified herein without additional cost to the Owner.

3.05 EXISTING UNDERGROUND UTILITIES

- A. The location of the existing underground utilities indicated on the drawings shall be considered approximate, and any locations may not be indicated or shown. The Contractor shall be responsible to have a thorough underground utility survey made in the path of the proposed underground utility work to locate and protect the known and unknown utilities, and to prevent

disrupting the affected utility. The Contractor shall be responsible for repairing damage to any utility caused by their work.

- B. Where any existing utilities are damaged, they shall be repaired as directed by the Engineer, with materials approved by the local utility company or the Owner, at no additional cost to the Owner.

3.06 SEPARATION OF UNDERGROUND RACEWAYS FROM OTHER UNDERGROUND UTILITIES

- A. Where underground utilities are encountered, separation shall be provided as follows:
 - 1. Parallel Installation:
 - a. Normal conditions: Conduits shall be laid at least ten feet horizontally from a utility line or related manhole whenever possible, the distance shall be measured edge-to-edge.
 - b. Unusual conditions: When local conditions prevent horizontal separation of ten feet, the duct bank may be laid closer to a utility line or related manhole provided that:
The bottom of the new conduit shall be at least twelve inches above the top or below the bottom of the other utilities.
 - 2. Crossing:
 - a. Normal conditions: Underground conduits crossing other utilities shall be laid to provide a separation of at least 12 inches between the conduit and the other utility whenever possible.

3.07 DISPOSITION OF DEBRIS

- A. The Contractor shall be responsible for removal from the property and disposal of all debris of whatever nature.

3.08 PROPERTY PROTECTION

- A. The Contractor shall be responsible for protecting all property and if damaged, repair to existing condition.

3.09 EROSION AND SEDIMENT CONTROL

- A. Precautions shall be taken throughout the duration of the project to prevent sediment throughout excavated area, as required by the Virginia Erosion and Sediment Control Law and shown on the drawings.
- B. Erosion control measures shall be provided until the seeded areas are sufficiently prepared and accepted by the Owner.

3.10 CONNECTIONS TO EXISTING UTILITY SYSTEMS, ETC.

- A. All connections to existing utility systems, etc., shall be made as required or deemed necessary to insure the maintenance of continued operation of the above and provide the very minimum of interruption. This Contractor shall make such temporary connections as may be required to facilitate this work and to protect the existing systems from damage. Any work which will in any

way affect the continued operation of any existing facility shall be coordinated with the proper authorities as well as the Engineer, and permission received, before any service is interrupted.

3.11 CUTTING AND PATCHING OF EXISTING WALKS, CURBS AND PAVEMENT

- A. All walks, curbs and pavement over trenches shall be restored to original condition and the Contractor will be responsible for any sinking in the walks, curbs, pavement or backfill which may occur within one year from acceptance by the Owner. All walks, curbs and pavement removed for trenching shall be saw cut before removal. Refer to other divisions for concrete paving specifications.

3.12 LAYING OUT THE WORK

- A. The Contractor shall lay out the work in accordance with the drawings, establish and maintain locations, lines, levels required for the work, and shall be responsible for its correctness. He shall report any discrepancies between the drawings and actual measurements to the Engineer for proper interpretation before proceeding with work affected by such discrepancies.
- B. Prior to any excavation, the Contractor shall stake out the routes of the proposed underground electric and telephone/comm/data services for review by the Owner and Engineer. Minor deviations in the routing may be required.

3.13 VERIFYING MEASUREMENTS AND CONDITIONS

- A. The exactness of grades, elevations, dimensions, or locations given on the drawings, is not guaranteed by the Engineer. The Contractor shall, therefore, satisfy himself as to the accuracy of all grades, elevations, dimensions, and locations. In all cases of interconnection of his work with existing or other work, he shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, locations, or dimensions shall be promptly rectified by him without cost to the Owner.

3.14 MISCELLANEOUS

- A. Metallic detection tapes shall be installed at the 50% backfill depth (12" maximum).
- B. Coordination is required with all existing and new underground utilities. Review all profiles indicated.

END OF SECTION

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SECTION 26 05 53 - – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Prepare and paint Division 26 equipment supports and miscellaneous materials located in Equipment Rooms, Mechanical Rooms, and other utility areas housing mechanical and/or electrical equipment.
- B. Identification of conduits, junction boxes, pull boxes, systems cabinets, panelboards, disconnect switches, motor protective switches, and other Division 26, 27, & 28 system enclosures.

1.03 WORK NOT INCLUDED

- A. Painting of factory finished Division 26, 27, & 28 Equipment such as Panelboards, etc.

1.04 RELATED WORK

- A. Section 26 05 00 – Common Work Results for Electrical
- B. Section 26 05 33 – Raceway and Boxes or Electrical Systems
- C. Section 26 24 16 – Panelboards
- D. Section 26 28 16 – Enclosed Switches
- E. Section 26 29 00 – Low-Voltage Controllers
- F. Division 23 – Mechanical
- G. Division 27 – Communications
- H. Division 28 – Electronic Safety and Security

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Except as otherwise specified, materials shall be the products of the following manufacturers:
 - 1. Sherwin-Williams
 - 2. Pratt and Lambert
 - 3. Devoe
 - 4. Benjamin Moore

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2.02 MATERIALS

- A. Deliver all paints and materials to the project site in their original containers with all labels intact and legible at the time of use.
- B. Sherwin-Williams Industrial Maintenance Coatings System 4000 products are listed below to establish color and a standard of quality.
 - 1. All Hangers and Supports: One coat Series 54 Gloss Black Alkyd Enamel.
 - 2. Factory Finished Equipment finishes shall be cleaned and properly touched up with equipment manufacturers touch-up paint unless finish is severely damaged or of unacceptable quality. In the latter case, the entire finish shall be restored in accordance with painted procedures herein specified.
 - 3. Any exposed electrical conduits, boxes, equipment hangers, equipment supports, etc. visible in a finished space shall be painted to match existing surfaces as directed by the Architect. (Note: Exposed conduits, boxes, etc. in finished areas are only permitted where specifically approved in advance by the Architect.)

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. The work shall be accomplished by qualified mechanics skilled in the painting trade. Painting of equipment and other materials shall not commence until all testing is complete and systems are ready for operation. Materials shall be evenly spread, and smoothly flowed on without runs or sags. Each coat shall be thoroughly dry before application of succeeding coats.

3.02 PROTECTION OF WORK

- A. The painters shall protect all adjacent surfaces with drop covers during the process of painting. Upon completion, paint spots, if any, shall be removed from all surfaces not intended to be painted.

3.03 PREPARATION OF SURFACE

- A. Surfaces to be painted shall be completely dry before applying paint. Metal surfaces shall be cleaned with mineral spirits before applying materials. Rust and scale shall be removed by wire brushing or sanding. Galvanized surfaces shall be chemically treated with crystalline zinc phosphate in strict accordance with the manufacturer's recommendations. Surfaces shall not be painted when the temperature is, or is likely to be, near the freezing point, nor when they are exposed to hot sun.

3.04 IDENTIFICATION OF PIPES AND EQUIPMENT

- A. Operating and control parts of the equipment and systems such as panelboards, data cabinets, system cabinets, disconnect switches, motor protective switches and control cabinets shall be properly identified with laminated engraved plastic nameplates fastened with sheet metal screws, bolts or permanent adhesive. Pressure sensitive tape is not acceptable. Identification symbols or designations shall be the same as shown on the contract documents.

- B. Boxes; Concealed and Surface Mounted: Each junction box, pullbox or similar enclosure shall be neatly identified by stencil marking which shall indicate service contained, and circuit numbers. Stencil letters shall be upper case (Capital) not less than one-half inch high and painted with Series 54 black gloss enamel.
- C. Conduit: The Contractor shall provide temporary removable tagging of all empty conduits provided for Communication Systems and Electronic Safety and Security Systems at their source to indicate for the installers of these systems what each conduit serves. In lieu of tagging, the Contractor may work directly with the installers in the field to identify the service of each such empty conduit.
- D. Room Numbers: All items are designated by room numbers shall use the Owner's actual room number designations as the room numbers given on the drawings may not be the actual room numbers to be assigned by the Owner. This includes panelboard schedules, wire and cable identification tags, programmable devices where the device is identified in the program or on the display by room numbers, etc. All final documentation turned over to the Owner including final shop drawings and O&M manuals shall refer to the Owner's true room numbers.
Contractor shall request from the Owner two weeks in advance of when he needs the Owner's actual room number designations.
- E. The main panelboard, and other similar systems shall have an engraved informational laminated nameplate with the installing trade's name, telephone number and address for the Owner to obtain preventive maintenance, service or parts. The nameplate shall include the job order number, shop number or other identification which will identify the related equipment.
 - 1. If the above address and telephone number is a branch office, the main office or manufacturer's address and telephone number shall be included.

END OF SECTION

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SECTION 26 05 73 - OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.
- B. IEEE 141 - IEEE Recommended Practice for Electric Power Distribution for Industrial Plants; 1993 (Reaffirmed 1999).
- C. IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings; 1990 (Reaffirmed 1997).
- D. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001, with Errata (2003).
- E. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

1.02 RELATED DOCUMENTS

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

1.03 WORK INCLUDED

- A. Short-Circuit analysis evaluation study
- B. Protective Device Time-Current Coordination study
- C. Field Adjustments to Equipment based on Study Findings
- D. Arc Flash Analysis Evaluation Study

1.04 RELATED WORK

- A. Section 26 0519 – Low Voltage Electrical Power Conductors and Cables
- B. Section 26 2000 – Low-Voltage Electrical Distribution
- C. Section 26 2416 – Panelboards
- D. Section 26 2813 – Fuses
- E. Section 26 2816 – Enclosed Switches and Circuit breakers

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1.05 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
 - 2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
 - 3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
 - 4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
 - 5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
- B. American National Standards Institute (ANSI):
 - 1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
 - 2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
 - 3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
 - 4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
- C. The National Fire Protection Association (NFPA)
 - 1. NFPA 70 -National Electrical Code, latest edition
 - 2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.06 SUBMITTALS

- A. Submit shop drawings in accordance with Section 26 0500.
 - 1. The studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.
 - 2. The results of the short-circuit, protective device coordination study shall be summarized in a final report.

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3. Division 26 shall also submit the report to the Local Authority Having Jurisdiction where required by the locality.
- B. The report shall include the following sections:
1. Executive Summary including Introduction, Scope of Work and Results/Recommendations.
 2. Short-Circuit Methodology Analysis Results and Recommendations
 3. Short-Circuit Device Evaluation Table
 4. Protective Device Coordination Methodology Analysis Results and Recommendations
 5. Protective Device Settings Table
 6. Time-Current Coordination Graphs and Recommendations
 7. Arc-Flash Methodology, Analysis, Results, and Recommendations
 8. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

1.07 QUALIFICATIONS

- A. The short-circuit, protective device coordination, and arc flash hazard analysis studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.
- B. The Registered Professional Electrical Engineer shall be an employee of the equipment manufacturer or an approved engineering firm.
- C. The Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies.
- D. The engineering firm shall have a minimum of ten (10) years experience in performing power system studies.

1.08 COMPUTER ANALYSIS SOFTWARE

- A. The studies shall be performed using one of the following software manufacturer programs:
 1. CYME International, Inc.
 2. EDSA Micro Corporation.
 3. Electrical Systems Analysis, Inc.
 4. SKM Systems Analysis, Inc.

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PART 2 PRODUCTS

2.01 STUDIES

- A. The contractor shall furnish short-circuit, protective device coordination, and arc flash studies. All studies shall be prepared by equipment manufacturer or approved engineering firm. The studies shall only cover the new equipment installed in/for the Auditorium as part of this project and any existing or new circuit breakers, fuses, switches, etc. installed in existing equipment in other buildings/locations used to supply the new Auditorium equipment.

2.02 DATA

- A. The contractor shall furnish all other data as required for the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- B. Source combination may include present and any known future motors and generators.
- C. Load data utilized shall include existing and proposed loads obtained from Contract Documents.
- D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.03 SHORT-CIRCUIT ANALYSIS

- A. Transformer design impedances shall be used when test impedances are not available.
- B. Provide the following:
 - 1. Calculation methods and assumptions
 - 2. Selected base per unit quantities
 - 3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.
 - 4. The study shall include input circuit data including source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
 - 5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.

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6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
- C. For solidly-grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the engineer performing the study.
- D. Protective Device Evaluation:
 1. Evaluate equipment and protective devices and compare to short circuit ratings.
 2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.
 3. Manufacturer shall notify Engineer in writing, of any circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS

- A. Protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.
- B. Include on each TCC graph, a complete title with descriptive device names.
- C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
- D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- E. Plot the following characteristics on the TCC graphs, where applicable:
 1. Low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
 2. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
 3. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves
 4. Ground fault protective devices, as applicable
 5. Pertinent motor starting characteristics and motor damage points, where applicable
 6. The largest feeder circuit breaker in each motor control center and applicable panelboard.
- F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.
- G. Provide the following:

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1. A one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.
2. A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
3. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.
4. The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices (including long time, short time, instantaneous, and ground fault (LSIG) settings of electronic trip circuit breakers), the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram
5. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
6. The design professional performing the study shall notify Engineer in writing of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

2.05 ARC FLASH STUDY

- A. A. Provide the following:
 1. 1. Calculation methods and assumptions.
 2. 2. Tabulations of calculated quantities including incident energy values.
 3. 3. Results, conclusions, and recommendations including the required personal protective equipment (PPE) category required to work on the equipment per NFPA 70E.

PART 3 EXECUTION

4.01 FIELD ADJUSTMENT

- A. Field adjustments to be completed by the design professional performing the study as part of this contract and prepare a report of all final settings.
- B. Contractor shall be responsible for making all modifications stated within these studies to the entire electrical system at no additional cost to the Owner. Interrupting current ratings on new equipment shall be provided to meet the requirements of the study.

1. EQUIPMENT LABELING

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- a. Upon acceptance of the study by the Engineer and after installation of the equipment, provide arc flash warning labels on equipment in accordance with NEC 110.16 and per ANSI Z535.4 guidelines. Warning levels shall list the PPE category required.

END OF SECTION

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SECTION 26 09 24 - - LIGHTING CONTROL SYSTEM

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI/ESD S20.20 - Standard for the Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices); 2021.
- B. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2019.
- C. CSA C22.2 No. 223 - Power Supplies with Extra-Low-Voltage Class 2 Outputs; 2015 (Reaffirmed 2020).
- D. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2011, with Amendment (2015).
- E. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2025.
- F. IEEE 1789 - IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers; 2015.
- G. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- H. ISO 9001 - Quality management systems -- Requirements; 2015.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- M. UL 508 - Industrial Control Equipment; Current Edition, Including All Revisions.
- N. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- O. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.
- P. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
- Q. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.
- R. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

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

1.03 WORK INCLUDED

- A. Wireless lighting control system and associated components:
 - 1. Wireless occupancy/vacancy sensors.
 - 2. Wireless daylight sensors.
 - 3. Wireless control stations for lighting.
 - 4. Load control modules.
- B. Wireless hub(s) for centralized control, monitoring, and system integration.

1.04 RELATED WORK

- A. Section 26 50 00 - Lighting

1.05 REFERENCES

- A. 147 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI/ESD S20.20 - Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices); 2014.
- C. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2002a (Reapproved 2010).
- D. CSA C22.2 No. 223 – Power Supplies with Extra-low-voltage Class 2 Outputs; 2015.
- E. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.
- F. IEEE 1789 - Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers; 2015.
- G. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).
- H. ISO 9001 - Quality Management Systems-Requirements; 2008.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- K. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; National Electrical Manufacturers Association; 2015.

- L. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2015).
- M. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- O. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- P. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- Q. UL 1310 – Class 2 Power Units; Current Edition, Including All Revisions.
- R. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
- S. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.
- T. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall controls with actual installed door swings.
 - 3. Coordinate the placement of daylight sensors with windows and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
 - 4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
 - 5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Sequencing: Do not install sensors and wall controls until final surface finishes are complete.

1.07 SUBMITTALS

- A. Shop Drawings: Lighting Control Manufacturer shall provide plans showing locations of all devices that are part of the system including manual control stations, occupancy/vacancy and/or daylight sensor locations. Manufacturer shall be responsible for exact placement of devices even if different from locations shown on Contract Documents. Where manufacturer calls for relocation of device on submittals from what is shown on the Contract Drawings,

manufacturer shall include a note of explanation regarding the need for the relocation in the submittals.

- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.
 - 2. Wall Dimmers: Include derating information for ganged multiple devices.
 - 3. Show available color and finish selections. Provide suggested labeling of manual controls. Final choice of color/finish of field devices such as wall controls as well as labeling convention of manual controls shall be by Architect.
- C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Sequence of Operation: Manufacturer shall provide a proposed sequence of operation for each space. Include diagrams or other similar information showing relationships between devices.
- E. System Performance-Verification Documentation; Submit documentation detailing start-up performance-verification procedures and functional tests performed along with test results.
- F. At Project Closeout, provide Project Record Documents showing actual installed locations and settings for lighting control system components.
- G. At Project Closeout, provide Operation and Maintenance (O&M) Manuals including detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals. See also Division 1 and Section 26 05 00 for requirements of O&M manuals.
- H. At Project Closeout, submit manufacturer's Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer. Warranty period shall not begin until system is fully tested and demonstrated to operate properly.
- I. At Project Closeout, provide training to the Owner's personnel as outlined in Section 3.6 of this specification.

1.08 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications:
 - 1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.

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2. Registered to ISO 9001, including in-house engineering for product design activities.
3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.
4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.
- B. Storage temperatures shall be between 50 and 140 degrees F.
- C. Protect lighting controls from dust.

1.10 WARRANTY

- A. Manufacturer's Standard 2-Year Warranty, with Manufacturer Full-Scope Start-Up
 1. Manufacturer Lighting Control System Components
 - a. First Two Years:
 - 1) 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.
 - 2) First-available on-site or remote response time.
 - 3) Remote diagnostics for applicable systems.
 - b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer & System: Lutron Electronics Company, Inc; Vive System.
- B. In order to be considered, any substitute manufacturer's system must utilize similar wireless components, must show proof of meeting manufacturer qualifications in Section 1.7 above, and must demonstrate that they can provide the same operation and functionality as the specified system in all aspects as outlined herein and on the drawings, including the process of programming and maintaining the system.
- C. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 GENERAL REQUIREMENTS

- A. Sensor Layout and Tuning:

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1. Lighting Control Manufacturer to take full responsibility for wireless occupancy/vacancy and daylight sensor layout and performance for sensors.
 2. Lighting Control Manufacturer shall verify that the sensor layout as show on the drawings provides adequate occupancy sensor coverage and ensure occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.
 3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.
- B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
- C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C) and 90 percent non-condensing relative humidity.
- E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
- F. Power Failure Recovery: When power is interrupted and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
- G. Wireless Devices:
1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.
 2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).
 3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).
 4. System does not require a factory technician to set up or program the system.
 5. Capable of diagnosing system communications.
 6. Capable of having addresses automatically assigned to them.
 7. Receives signals from other wireless devices and provides feedback to user.
 8. Capable of determining which devices have been addressed.

9. RF Range: 60 feet (18 m) line-of-sight or 30 feet (9 m) through typical construction materials between RF transmitting devices and compatible RF receiving devices.
10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 15, for Class B application.

H. Wireless Network:

1. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
 - a. Wireless sensors, wireless wall stations and wireless load control devices do not operate in the noisy 2.4 GHz frequency band where high potential for RF interference exists.
 - b. Wireless devices operate in an uncongested frequency band providing reliable operation.
 - c. Fixed network architecture ensures all associated lights and load controls respond in a simultaneous and coordinated fashion from a button press, sensor signal, or command from the wireless hub (i.e. no popcorning).
2. Distributed Architecture: Local room devices communicate directly with each other. If the wireless hub is removed or damaged, local control, sensing, and operation continues to function without interruption.
3. Local room devices communicate directly with each other (and not through a central hub or processor) to ensure:
 - a. Reliability of system performance.
 - b. Fast response time to events in the space (e.g. button presses or sensor signals).
 - c. Independent operation in the event of the wireless hub being removed or damaged.

I. Device Finishes:

1. Wall Controls: Finish to be selected by the Architect.
2. Standard Colors: Comply with NEMA WD1 where applicable.
3. Color Variation in Same Product Family: Maximum delta E of 1, CIE L*a*b color units.
4. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

2.03 WIRELESS SENSORS

A. General Requirements:

1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.

2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
3. Does not require external power packs, power wiring, or communication wiring.
4. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:

1. General Requirements:
 - a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
 - b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
 - c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
 - d. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity.
 - e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes. All time delays shall initially be set at 20 minutes unless otherwise directed.
 - f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.
 - g. Color: White.
 - h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
 - i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.
 - j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.
 - k. Ceiling-Mounted Sensors:
 - 1) Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
 - 2) Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.

- I. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.
2. Wireless Combination Occupancy/Vacancy Sensors:
 - a. Ceiling Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one footcandle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).
 - b. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).
 - c. Product(s):
 - 1) Ceiling-Mounted Occupancy/Vacancy Sensor; Lutron Radio Powr Savr Series, Model LFR2-OCR2B-P-WH: Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.
 - 2) Wall-Mounted Occupancy/Vacancy Sensor; Lutron Radio Powr Savr Series, Model LFR2-OWLB-P-WH: Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.
 - 3) Hallway Occupancy/Vacancy Sensor; Lutron Radio Powr Savr Series, Model LFR2-OHLB-P-WH: Long narrow field of view with coverage for major motion up to 150 ft.
 - 4) Corner-Mounted Occupancy/Vacancy Sensor; Lutron Radio Powr Savr Series, Model LFR2-OKLB-P-WH: Minor motion coverage of 1225 square feet (113.8 sq m) and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 90 degree field of view.

C. Wireless Daylight Sensors:

1. Product: Lutron Radio Powr Savr Series, Model LFR2-DCRB-WH.
2. Open-loop basis for daylight sensor control scheme.
3. Stable output over temperature from 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C).
4. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
5. Provide linear response from 2 to 150 footcandles.
6. Color: White.
7. Mounting:

- a. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
- b. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
- c. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor.
Temporary mounting method to be design for easy, damage-free removal.

2.04 LOAD CONTROL MODULES

- A. A. Provide wireless load control modules as indicated or as required to control the loads as indicated.
- B. Junction Box-Mounted Modules:
 1. Plenum rated.
 2. Dimming Modules:
 - a. Product(s):
 - 1) 8 A dimming module with 0-10V control; Lutron PowPak Dimming Module Model RMJS-8T-DV-B
 - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 - c. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
 - d. Selectable minimum light level.
 - e. Configurable high- and low-end trim.
 - f. Relay: Rated for 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.
 - g. Provide emergency type modules where required for control of light fixtures that serve as both normal and emergency lighting, whose emergency power source is a central battery inverter.
 3. Relay Modules:
 - a. Product(s):
 - 1) 16 A relay module, without contact closure output; Lutron PowPak Relay Module Model RMJS-16R-DV-B.
 - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.

- c. Provide emergency type modules where required for control of light fixtures that serve as both normal and emergency lighting, whose emergency power source is a central battery inverter.
- d. Relay:
 - 1) Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
 - 2) Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
 - 3) Fully rated output continuous duty for inductive, capacitive, and resistive loads.
- e. Contact Closure Output:
 - 1) Single contact closure output with normally open and normally closed dry maintained contacts suitable for connection to third party equipment (e.g. building management system, HVAC system, etc.).
 - 2) Contact Ratings: Resistive load; 1 A at 0-24 VDC, 0.5 A at 0-24 VAC.
 - 3) Controlled by associated occupancy/vacancy sensors and wall controls.
- 4. Emergency Power Control Device: Where shown on the drawings, provide an UL 924 listed emergency power control device, LVS Model #EPC-2 series) or acceptable equal, supplied from an emergency (generator) life safety circuit or from a lighting inverter. The device shall be connected to the load side of the load control module (PowPak). During a normal power outage, this device will automatically bypass the power pack (and therefore, all circuit controls) and transfer the lights to the generator circuit or inverter, basically turning on all lights connected to it to full power to provide required emergency egress lighting. Provide proper model number necessary to coordinate with either dimmable or non-dimmable power packs, depending on application.

2.05 WIRELESS CONTROL STATIONS

- A. Product(s):
 - 1. 2-Button Control; Lutron Pico Wireless Control Model PJ2-2B.
 - 2. 2-Button with Raise/Lower Control; Lutron Pico Wireless Control Model PJ2-2BRL.
 - 3. Screw Mounting Kit; Lutron Model PICO-SM-KIT.
 - 4. Wallbox Adapter; Lutron Model PICO-WBX-ADAPT (where required).
- B. Quantity: As indicated on drawings.
- C. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
- D. Does not require external power packs, power or communication wiring.

- E. Allows for easy reprogramming without replacing unit.
- F. Button Programming:
 - 1. Single action.
 - 2. Toggle action.
- G. Includes LED to indicate button press or programming mode status.
- H. Mounting:
 - 1. Capable of being mounted with a table stand or directly to a wall under a faceplate.
 - 2. Faceplates: Provide concealed mounting hardware. All wall-mounted wireless control stations shall be provided with a faceplate.
- I. Power: Battery-operated with minimum ten-year battery life.
- J. Finish: To be selected by Architect.
- K. Marking of Buttons: All proposed marking of buttons shall be provided in the shop drawing submittal.

2.06 WIRELESS HUBS

- A. Product(s):
 - 1. Flush mount Wireless hub without BACnet; Lutron Vive Hub: Model HJS-1-FM.
- B. Integrated multicolor LED provides feedback on what mode the hub is in for simple identification and diagnosis.
- C. Integrated processor and web server allows hub to set up and operate the system without any external connections to outside processors, servers, or the internet.
- D. Utilizes Ethernet connection for:
 - 1. Networking up to 64 hubs together to create a larger system.
 - 2. Remote connectivity capabilities, including maintaining system date/time and receiving periodic firmware updates (requires internet connection).
- E. A single hub or network of hubs can operate on either a dedicated lighting control only network or can be integrated with an existing building network as a VLAN.
- F. Communicates directly to compatible Lutron Vive RF devices through use Lutron Clear Connect radio frequency communications link; does not require communication wiring; RF range of 71 feet (23 m) through walls to cover an area of 15836 square feet (1471 sq m) (device and hub must be on the same floor).
- G. Communicates directly to mobile device (smartphone or tablet) or computer using built-in Wi-Fi, 2.4 GHz 802.11b/g; wireless range of 71 feet (23 m) through walls (device and hub must be on the same floor).

1. Does not require external Wi-Fi router for connecting to the hub.
- H. Allows for system setup, control, and monitoring from mobile device or computer using Vive web-based software:
1. Supports up to 700 total paired devices including compatible wireless sensors, wireless control stations, and wireless load devices.
 2. Allows for timeclock scheduling of events, both time of day and astronomic (sunrise and sunset).
 - a. Timeclock is integrated into the unit and does not require a constant internet connection.
 - b. Retains time and programming information after a power loss.
 - c. Utilizes weekly calendar view for monitoring and adjustment of scheduled events.
 - d. Time clock events can be scheduled to:
 - 1) Send lights to a desired level.
 - 2) Adjust level lights go to when occupied.
 - 3) Adjust level lights go to when unoccupied.
 - 4) Enable/disable occupancy.
 - 5) Adjust timeout of sensors (requires Model FC-SENSOR wired fixture sensor or Model DFCSJ-OEM-OCC wireless fixture control dongle with integral sensing capabilities).
 3. Daylighting:
 - a. Daylighting can be enabled/disabled. Can be used to override the control currently taking place in the space.
 - b. Daylight set point can be adjusted with the software to increase or decrease the electric light level in the room based on the same amount of natural light.
 4. Allows for control, monitoring, and adjustment from anywhere in the world (Lutron Vive wireless hub internet connection required).
 5. Uses RF signal strength detection to find nearby devices for quick association and programming without having to climb ladders.
 - a. Association and setup does not require a factory technician to perform.
 6. System using Lutron Vive wireless hub(s) can operate with or without connection to the internet.
 7. Supports energy reporting.

- a. Reports measured energy data for PowPak fixture control modules at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher).
 - b. Reports calculated energy data for PowPak junction box mounted modules at accuracy of 10 percent.
- 8. Supports automatic demand response for load shedding via:
 - a. Local contact closure without need for separate interface.
- 9. Wireless hub can be firmware upgraded to provide new software features and system updates.
 - a. Firmware update can be done either locally using a wired Ethernet connection or Wi-Fi connection, or remotely if the wireless hub is connected to the internet.
- I. Lutron Vive Web-Based Application:
 - 1. Accessibility and Platform Support:
 - a. Web-based; runs on most HTML5 compatible browsers (including Safari and Chrome).
 - b. Supports multiple platforms and devices; runs from a tablet, desktop, laptop, or smartphone.
 - c. User interface supports multi-touch gestures such as pinch to zoom, drag to pan, etc.
 - d. Utilizes HTTPS (industry-standard certificate-based encryption and authentication for security).
 - e. Multi-level Password Protected Access: Individual password protection on both the integrated Wi-Fi network and web-based software.
 - f. WPA2 security for Wi-Fi communication with wireless hub.
 - 2. System Navigation and Status Reporting:
 - a. Area Tree View: Easy navigation by area name to view status and make programming adjustments through the software.
 - b. Area and device names can be changed in real time.
 - 3. Setup app available for iOS and Android that allows for:
 - a. Job registration to extend product warranty.
 - b. Management of setup for multiple projects in different locations.
 - c. Creation of handoff documents that are sent directly to a facility manager via email once setup is complete.
 - d. Access to native help and instructions to assist user with Vive system setup.

- J. Contact Closure Interface: Provide two contact closure inputs; accepts both momentary and maintained contact closures that can be used for automatic demand response.
- K. Rated for use in air-handling spaces as defined in UL 2043.

2.07 SOURCE QUALITY CONTROL

- A. Factory Testing; Lutron Standard Factory Testing:
 - 1. Perform full-function factory testing on all completed assemblies. Statistical sampling is not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Pre-Installation Consultation; As necessary, Lighting Control Manufacturer shall conduct on-site meeting with installers prior to commencing work. Manufacturer to review with installer:
 - 1. Low voltage wiring requirements.
 - 2. Separation of power and low voltage/data wiring.
 - 3. Wire labeling.
 - 4. Wireless hub locations and installation.
 - 5. Sensor locations.
 - 6. Control locations.
 - 7. Load circuit wiring.
 - 8. Network wiring requirements.
 - 9. Connections to other equipment.
 - 10. Installer responsibilities.
- B. System and Network Integration Consultation; As necessary, Lighting Control Manufacturer shall conduct meeting with Contractor, facility representative and other related equipment manufacturers to discuss equipment and integration procedures.

- C. System Setup and Operational Consultation; Lighting Control Manufacturer shall conduct meeting with Owner's representatives and Project Engineer to walk them through the proposed sequence of operation of the lights in each space and to receive feedback that the proposed operation meets the Owner's desired functionality. Where Owner or Engineer requests changes that are a matter of programming or setup (no changes to quantities of equipment or proposed wiring), the Lighting Control Manufacturer shall adjust the operation per the Owner's direction at no cost. This meeting shall be scheduled to suit the Owner.
- D. Coordinate scheduling of above meetings with Lighting Control Manufacturer. Manufacturer recommends that all meetings be scheduled early in construction phase, after system purchase but prior to system installation.

3.03 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130.
- B. Install products in accordance with manufacturer's instructions.
- C. Sensor Locations:
 - 1. Locate sensors in accordance with layout provided in submittals by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
 - 2. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.
 - 3. Locate all power packs in accessible locations (such as above accessible ceilings) or in mechanical/electrical/IT rooms. Power packs shall not be located where they are visible or can easily be accessed by the public.
- D. Ensure that daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.
- E. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in. If the lamp leads exceed the specification, premature lamp failure and/or trouble starting the lamps may result.
- F. LED Light Engine/Array Lead Length: Do not exceed 100 feet (31 m).
- G. Identify system components in accordance with Section 26 05 53.

3.04 FIELD QUALITY CONTROL

- A. Provide manufacturer's representative on-site for full programming, startup, and testing of system. Contractor shall provide manufacturer's representative for as long as necessary to insure proper operation of the system.
- B. Manufacturer's Representative shall perform the following:

1. Verify sensor locations, in accordance with layout provided in submittals by Lighting Control Manufacturer; Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
 2. Verify connection of power wiring and load circuits.
 3. Verify connection and location of controls.
 4. Energize wireless hubs.
 5. Associate occupancy/vacancy sensors, daylight sensors, wireless remotes, and wall stations to load control devices.
 6. Provide calibration of sensors.
 7. Program timeclock schedules per approved sequence of operations.
 8. Configure load shed parameters per approved sequence of operations.
 9. Verify system operation control by control.
 10. Obtain sign-off on system functions.
 11. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".
- C. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.05 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

A. Demonstration:

1. The Contractor and/or Lighting Control Manufacturer Representative shall demonstrate proper operation of lighting control devices to Owner's representatives and Engineer and correct deficiencies or make adjustments as directed. This shall include a room-by-room demonstration as directed by the Owner's representatives and/or Engineer.

B. Training:

1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system.
2. The trainer shall not be performing any other functions (such as setup, testing, or system demonstration) while the training session is ongoing.
3. Allow up to four (4) hours for training.

4. Training shall be scheduled to suit the Owner.
5. Training shall include printed training manuals providing the information covered in the training session.

3.07 PROTECTION

- A. Protect installed products from subsequent construction operations.

END OF SECTION

SECTION 26 20 00 - - LOW VOLTAGE ELECTRICAL DISTRIBUTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Connections For:
 - 1. Kitchen Equipment
- B. Contactors and Relays
- C. Special Voltages

1.03 RELATED WORK

- A. Division 12 – Furnishings
- B. Division 22 – Plumbing
- C. Division 23 – Mechanical
- D. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
- E. Section 26 05 23 – Control Voltage Electrical Power Cables
- F. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- G. Section 26 05 53 – Identification for Electrical Systems
- H. Section 26 27 26 – Receptacles
- I. Section 26 28 16 – Enclosed Switches
- J. Division 27 – Communications
- K. Division 28 – Electronic Security and Safety

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 26 05 00.
 - 1. Shop Drawings for contactors, relays shall include:
 - a. Scale drawing of enclosure and internal components.
 - b. Internal wiring schematic.
 - c. Roughing-in requirements.

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2. Product Data: Submit application, technical, and installation data.
- B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00 for contactors, relays, buck/boost transformers.

PART 2 PRODUCTS

2.01 PRODUCTS

- A. Contactors and Relays:
 1. Shall be provided as required for proper circuit control. Each contactor shall have a hand-off-automatic switch and L.E.D. indicator S.
- B. Buck/Boost Transformers: Square D, Cutler-Hammer, G.E., Siemens, Hevi-Duty or acceptable equal S.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Division 26 shall provide the installation methods specified hereinafter for the following equipment:
 1. Kitchen Equipment
 - a. All electrical work for receptacles or connections to the equipment shall be made by the Electrical Trade. Do no roughing-in or other electrical work in these areas until roughing-in drawings reviewed by the Architect-Engineer are received. The presumed location of all presently envisioned equipment having electrical connections is shown on the drawings and specified herein, but this is for estimating purposes only and the Contractor shall prepare his bid to allow for any possible rearrangement of the equipment listed, or as indicated. Provide permanent liquid-tight flexible metal conduit connections to the equipment from the outlet boxes or conduit stubbed up above the floor or conduit stubbed down from the ceiling for all equipment indicated, except where receptacles are indicated. These connections shall include but not be limited to; disconnect switches, motor protective switches and other wiring devices as required per the manufacturer's drawings, the NEC and the Contract Documents.
- B. Contactors and Relays: Install all contactors and relays in accordance with NEC as required.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

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 this Section.

1.02 WORK INCLUDED

- A. Branch Panelboards
- B. Circuit Breakers

1.03 RELATED WORK

- A. Section 26 05 53 – Identification for Electrical Systems

1.04 QUALITY ASSURANCE

- A. Integrated Circuit Breaker Panelboard Rating: Each panelboard, as a complete unit, shall have a rating equal to or greater than the integrated equipment rating shown on the panelboard schedule on the plans. Such rating shall be established by test with the circuit breakers mounted on the panelboard. The short-circuit tests on the circuit breaker and on the panelboard structure shall be made simultaneously by connecting the fault to each panelboard breaker with the panelboard connected to its rated voltage source. Method of testing shall be per proposed UL standards pertaining to listing of molded case circuit breakers for high-interrupting capacity ratings. The source shall be capable of supplying the specified panelboard short-circuit current or greater. Test data showing the completion of such tests upon the entire range of distribution and power panelboards to be furnished shall be submitted to the Engineer, if requested by him, with or before the submittal of approval drawings. Testing of panelboard circuit breakers for short-circuit rating only with the breaker individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable.

1.05 REFERENCES

- A. All enclosed circuit breakers and panelboards shall meet and comply with applicable sections of UL, NEC and NEMA.

1.06 SUBMITTALS

- A. Submit shop drawings in accordance with Section 26 05 00.
 - 1. Shop drawings for each panelboard shall include:
 - a. Dimensioned layout.
 - b. EXACT Arrangement of circuit breakers as indicated in the schedules. (Automatic "Rejection" of shop drawings if not followed.)
 - c. Bus ampacity, interrupting capacity, and composition.

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- d. Main lug capacity and location.
 - e. Future provision.
2. Circuit Breaker shop drawings shall include:
- a. Frame type and ampere rating.
 - b. Trip amperage.
 - c. Interrupting rating in RMS symmetrical amps.
 - d. Accessories.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. All panelboards shall be as manufactured by Square D or acceptable equal by Eaton, ABB, or Siemens.
- B. All circuit breakers shall be as manufactured by Square D or acceptable equal by Eaton, ABB, or Siemens.
- C. All replacement circuit breakers as indicated.

2.02 MATERIALS AND TYPE

- A. General:
 - 1. Panels shall be dead front automatic circuit breaker as indicated and designed for type of service encountered.
- B. Panelboards S:
 - 1. Breakers: Square D frame sizes are called for on the drawings to designate type of breaker to be installed. All breakers shall have a minimum interrupting capability of 10,000 amperes rms symmetrical or higher for 120/240 volt panels as noted on drawings, and shall be U.L. listed. The breaker's line terminal connection shall bolt directly to the panelboard's bus connecting strap or shall be a bus bar clamp type connection with bolt on device. Multi-pole breakers shall be in one molded case, common trip, with one operating handle. Where space only is indicated, provide mounting straps for future breaker.
 - 2. Cabinets and Trim: Cabinets shall be of all code gauge galvanized steel, 6" minimum outside depth, with studs for mounting interiors. Minimum of 4" side gutters; top and bottom gutters as required; special gutter sizes as indicated on the drawings. Raceway openings to be 2" clear from front of cabinet. Steel front shall be grey lacquered Code gauge (#12 gauge) minimum for 225 amp bus panelboards and smaller amperage types, and (#10 gauge minimum) for 250 amp bus panelboards and higher amperage types, complete with metal framed index card holder, door with flush latch, concealed hinges,

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lock (two keys for each panel with all panels keyed alike) concealed adjustable trim clamps or screws and full height piano hinged trim. Only full height piano hinged trim fronts will be acceptable.

3. Interior:

- a. All bus structure shall be copper with silver, cadmium or tin plating and insulated. Provide individual full solid plated copper neutral bus and solid plated copper ground bus. The bus structure and main lugs, including any feed-through lugs, sub-feed (double) lugs and main circuit breaker where required, shall have the current ratings as indicated.
- b. Provide mechanical screw type U.L. Listed lugs to accept solid and/or stranded copper and aluminum conductors for 90° C rated wire to accommodate the conductors indicated including derated conductors and oversized neutrals, as required.

4. Miscellaneous: Panelboards; that are indicated to be service equipment shall be rated and labeled for "Suitable for Service Entrance" by U. L.

C. Molded Case Circuit Breakers (MCCB) S:

1. Ratings and special features shall be as scheduled.
2. Trips shall be thermal magnetic with inverse time delay and instantaneous time-current characteristics.
3. 225 ampere frame and larger MCCB shall have permanent non-interchangeable trips, unless indicated otherwise on the drawings, factory-calibrated at 40 degrees C, and adjustable magnetic feature set by a single adjustment. Interchangeable trips will be considered as an alternative.
4. Industrial grade MCCB shall be provided except that commercial or residential grade MCCB (quick-lag "Q-Line") may be used for MCCB 100 amperes and below where other indicated criteria are met.
5. Ambient compensating MCCB shall be provided for outdoor applications or where indicated on drawings.
6. MCCB shall not be used for switching lights unless they are specifically rated for switching duty.
7. U.L. listed HACR type circuit breakers shall be provided for use with air conditioning, heating and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.
8. Circuit breakers shall have removable lugs. Lugs shall be UL listed for copper and aluminum conductors. Breakers shall be UL listed for installation of mechanical screw-type lugs and compression type lugs.

9. Current limiting circuit breakers shall meet UL requirements as current limiting circuit breakers, NEMA Standard AB1-1975 and Federal Specifications W-C-375B/GEN.
10. Combinations for series connected interrupting ratings shall be recognized by Underwriters Laboratories and shall appear in the Recognized Component Directory under the "Circuit Breakers - Series Connected" product category DKS2. Current limiting circuit breakers shall allow the use of branch circuit breakers with lower interrupting capacities on systems capable of delivering fault currents up to 200,000 rms symmetrical amperes at 480V ac and 100,000 rms symmetrical amperes at 600V ac.
11. Where indicated on the riser provide Honeywell E-Mon Class 2000 KWH meter for monitoring of panel K.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Set all cabinets of all branch circuit and distribution panelboards, with top 6'-0" above finished floor, unless noted otherwise, or unless panel is taller than 4'-6".
- B. Index cards to be properly labeled with typewritten letters indicating loads controlled by each circuit complete with room designation matching the Owner's final labeling.
- C. Interior trims of all panels shall be pulled up flush with front covers.
- D. Panelboards shall not be activated ("hot") without all protective covers and enclosures installed.

3.02 FIELD QUALITY CONTROL

- A. Technical Assistance: The panelboard manufacturer's representative shall generally provide installation supervision of this equipment if requested by the contractor.
- B. Calibration and Testing: The panelboard manufacturer's representative shall provide a factory trained technician for initial calibration of circuit breaker trip and time delay settings to indicated values including ground fault protection system performance testing (NEC 230.95). All calibration and testing shall be in accordance with the manufacturer's written instructions, NETA and all applicable codes and industry standards. Written records of the calibration and test procedures shall be submitted to the Owner, Architect/Engineer and Local Authority Having Jurisdiction (if required). These test procedures shall also include an insulation test, torquing of all connections, electrical interlocking verification, etc.

END OF SECTION

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SECTION 26 27 26 - RECEPTACLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Receptacles
- B. Plates

1.03 RELATED WORK

- A. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- B. Section 26 50 00 – Lighting

1.04 REQUIREMENTS

- A. NEC 406 (Receptacles)

1.05 SUBMITTALS

- A. Submit shop drawings, product data and wiring device samples in accordance with Sections 26 05 00.
- B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Receptacles S shall be as manufactured by:
 - 1. Hubbell,
 - 2. Cooper-Crouse Hinds
 - 3. Pass and Seymour (P&S)
 - a. All receptacles shall be by the same manufacturer.
- B. USB Charging Receptacles S: Leviton or acceptable equal.
- C. Wiring Device Plates S and Blank Plates S shall be as manufactured by:
 - 1. Hubbell,
 - 2. Cooper Crouse-Hinds,
 - 3. Pass & Seymour (P&S)

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- a. All plates shall be by the same manufacturer. "Wet Location" (WL) (WP) (LP) plate and covers by:
4. Tay-Mac™ Corp.,
5. Hubbell,
6. Cooper Crouse-Hinds
7. Pass & Seymour (P&S)

2.02 MATERIALS AND TYPE

- A. All receptacles and other wiring devices shall be as indicated on drawings and specified hereinafter.
 1. Unless otherwise indicated on the drawings all receptacles shall be:
 - a. Hubbell heavy duty specification grade "HBL" series,
 - b. Cooper Industrial Specification grade "5362" series,
 - c. Pass & Seymour heavy duty specification grade "5362" series
 - d. The receptacles shall be complete with one-piece plated grounding system, self-grounding, back side wired, and high impact polycarbonate, Lexan™, or nylon faces. Receptacle shall be rated for the voltage, poles, amperage and NEMA configuration required. Provide the proper nylon or polycarbonate bodied plug where indicated for equipment connection.
 2. Selected NEMA 5-20 receptacles shall be ground-fault circuit-interrupter type as indicated. Ground fault circuit interrupting receptacles, unless otherwise indicated on the drawings, shall be equal to the same receptacles series specified in paragraph A.2.
 3. All other NEMA configurations (amperage and type) shall be equal to the same receptacle series specified in paragraph A.2. Provide matching nylon or polycarbonate bodies plug to match receptacle for all connected equipment where the equipment is not furnished with plug.
 4. USB Charging Outlets: Shall be combination with one NEMA5-20R outlet and two (2) USB charging ports, one type A and one type C. Hubbel USB20ACPDW or equal.
- B. Plates: For all systems unless indicated otherwise.
 1. For Concealed Work: Stamped stainless steel type 302 with satin finish.
 2. For Wet Locations:
 - a. While in Use (WL) (LP): Weatherproof NEMA-3R enclosure constructed of flame retardant U.V. stabilized polycarbonate, reinforced thermoplastic, die-cast metal or combinations of the above materials complete with sealing gaskets and stainless steel mounting screws; and meets OSHA and NEC requirements "WHILE IN USE". Housing size shall depend on the wiring device being protected. Housing for

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receptacles shall allow both angled and straight cord connectors. As manufactured by Tay-Mac® Corp., P&S, Hubbell, Cooper Crouse-Hinds or acceptable equal.

Finish of "While-in-Use" cover shall be chosen by the Architect.

3. For F.S. or F.D. Boxes (Interior Only): Die cast covers with gaskets, as manufactured by Crouse-Hinds, Appleton, Red Dot or acceptable equal.
 4. Screws: Heads to match plate material and finish.
 5. Provide blank plates for all unused outlets.
- C. Wiring Device and Plate Colors: Architect will review and accept color of wiring devices. Contractor shall allow for selection from "standard" colors (grey, white, ivory, brown) of wiring devices in his bid proposal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All wiring devices shall be mounted at elevations indicated.
- B. All duplex receptacles shall be mounted vertical with ground slots towards floor, unless otherwise indicated by the Owner or Authority having jurisdiction.
- C. Install plates on all outlets and wiring devices, with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional device plates will not be permitted.
- D. Where the wall opening for a wall or casework outlet box is larger than a standard plate cover, repair the outlet opening to accept a standard size plate. "Jumbo" or "Junior Jumbo" device plates are not acceptable.
- E. Provide ground-fault interrupter type (GFCI or GFI) NEMA 5-20 receptacles where NEMA 5-20 receptacles are indicated in or at the following locations unless ground fault interrupter branch circuit breakers are indicated:
 1. Bathrooms, showers, toilets.
 2. Within 6'-0" radius of all lavatories and sinks, and at all elevations.
 3. All exterior locations including patios, decks, etc.
 4. All other current Virginia USBC, NEC and OSHA GFCI required locations.
- F. All exterior wiring device outlet boxes shall utilize wet location (WL) "While in Use" enclosures.
- G. Division 26 shall furnish the polycarbonate or nylon angular plugs for the indicated equipment furnished without that require such. Division 26 shall install the plugs on the equipment including proper specified flexible cable (cord).

END OF SECTION

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SECTION 26 28 13 - FUSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Fuses S

1.03 RELATED WORK

- A. Section 26 28 16 – Enclosed Switches
- B. Section 26 29 00 – Low-Voltage Controllers

1.04 SUBMITTALS

- A. Submit product data in accordance with Section 26 05 00.
 - 1. Product Data: Submit application, technical, and installation data.

PART 2 PRODUCTS O/M

2.01 MANUFACTURERS

- A. All Fuses shall be as manufactured by Cooper Industries, GEC Alsthon, Littlefuse, Gould-Shawmut (Nippon Mining). S

2.02 MATERIALS AND TYPE

- A. Motor and Panelboard Fuses: Rejection type C class RK-1, dual element, time-delay, current limiting, cartridge type, by 300TM Low-Peak Yellow™ by Bussman, Lolp® by CEFCo, Power-Pro® by Littlefuse, "AMP-TRAP 2000" by Gould-Shawmut (Nippon Mining), with a minimum interrupting rating of 200,000 amperes rms symmetrical.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Fuses for motor circuits shall be sized in accordance with the fuse manufacturer's sizing chart for "motor running overload protection", unless otherwise required for a specific motor. All other fuses for other than motor circuits shall be of size and type as required by the connected equipment manufacturer's written instructions unless otherwise indicated. Labels indicating size and type of replacement fuses shall be glued to inside of door on all fusible switches.

END OF SECTION

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SECTION 26 28 16 - - ENCLOSED SWITCHES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 RELATED DOCUMENTS

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

1.03 WORK INCLUDED

- A. Disconnect Switches

1.04 RELATED WORK

- A. Section 26 05 53 – Identification for Electrical Systems
- B. Section 26 20 00 – Low-Voltage Electrical Distribution
- C. Section 26 28 13 – Fuses
- D. Section 26 29 00 – Low-Voltage Controllers

1.05 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 26 05 00.
 - 1. Shop Drawings for Disconnect Switches shall include:
 - a. Scale drawing of enclosure and internal components.
 - b. Roughing-in requirements.
 - 2. Product Data: Submit application, technical, and installation data.
- B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 PRODUCTS O/M

2.01 MANUFACTURERS

- A. All disconnect switches shall be Square D (Group Schneider) Class 3110 Heavy Duty Visible-Blades® safety switches, General Electric Spec-Setter® Heavy Duty Type TH (to 600A), and Type TC (800A & 1200) safety switches S, Cutler-Hammer/Eaton Heavy Duty Type DH series safety switches, and Siemens Vacu-Break VBII™ Heavy Duty safety switches.

2.02 MATERIALS AND TYPE

- A. Disconnect Switches: Rated for voltage encountered, poles and amperage as required. Heavy Duty, NEMA enclosures, fusible for rejection type class R fuses only, solid neutral assembly, equipment grounding kit, unless otherwise indicated. Refer to NEMA type under PART 3 - EXECUTION.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide disconnect switches for all motors and appliances for the project where required by the National Electrical Code; and rated for the voltage encountered complete with required poles, amperage rating and all accessories. Not all disconnect switches required by NFPA 70 are necessarily indicated on the drawings.
- B. Provide rain-tight NEMA-3R, NEMA-4, NEMA-4X, explosion-proof or other NEMA enclosures for switches where required by NEC and environmental conditions.

END OF SECTION

SECTION 26 29 00 - VOLTAGE CONTROLLERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Motor Protective Switches
- B. Control Accessories

1.03 RELATED WORK

- A. General: The Contractor shall consult all other sections of these Contract Documents specifications containing any type of equipment requiring electrical connections and allow for wiring and controlling all equipment as described therein even though not shown on the electrical drawings. See mechanical drawings for exact locations and names of Mechanical Equipment and Controls. (Division 23)
- B. Division 23 - Mechanical

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 26 05 00.
 - 1. Shop Drawings shall include:
 - a. Scale drawing enclosure and internal components.
 - b. Internal wiring schematic.
 - c. Roughing-in requirements.
 - 2. Product Data: Submit application, technical, and installation data.
- B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. All motor protective switches shall be as manufactured by Square D, Cutler-Hammer/Eaton, G.E., Siemens, or Allen Bradley. All controllers and accessories to be by the same manufacturer.

2.02 MATERIALS AND TYPE

- A. Motor Protective Switches S: Marked MP' on drawings. Manual type with overload relay for each phase, with poles as required and separately wired neon or L.E.D. pilot light. M.P. switch and pilot shall be mounted on one (1) multi-gang plate.

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- B. Heaters S: Install thermal overload heater elements in all switches on the job whether or not the switches and starters are furnished by this subcontractor. Assume responsibility for proper application of motor running protection for all motors in accordance with the manufacturer's recommendations and the nameplate rating of the motors actually installed. All phases to have overload protection.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Motors: All motors and motor-driven equipment will be provided in place by another Trade, ready for connection by the Electrical Trade with control equipment provided by the Trade who provides the equipment unless specifically indicated otherwise. Motor branch circuits, etc., are designed for motor sizes as shown on the drawings. The motors and motor-driven equipment actually installed may vary from these sizes. The Electrical Trade shall verify actual sizes and notify the Engineer of any required changes.
- B. Provide all required motor protective switches, rated for the voltage encountered, complete with required poles, amperage rating and all accessories, unless indicated otherwise.
- C. Responsibility: The Mechanical Trade is responsible for the proper operation of the mechanical systems. The Electrical Trade is responsible for all electrical work in connection therewith.
- D. Certain multi-speed fractional horsepower motors are indicated on the Division 23 Electric Sequence Drawings to have built-in overload protection in the motor in lieu of motor protective switches.
- E. All wiring within the motor starter (control) enclosure and to the motor shall be Type MTW stranded copper per Section 26 05 19 and Section 26 05 23.

END OF SECTION

SECTION 26 41 00 - LIGHTNING PROTECTION SYSTEM

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 780 - Standard for the Installation of Lightning Protection Systems; 2020.
- B. UL 96A - Standard for Installation Requirements for Lightning Protection Systems; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 WORK INCLUDED

- A. Complete Lightning Protection System with Accessories
- B. Ground System

1.04 RELATED WORK

- A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems

1.05 SYSTEM DESCRIPTION

- A. The Lightning Protection System shall be a complete system of air terminals, conductors, ground terminals, interconnecting conductors, arresters, and other connectors or fittings required to complete the system, for the practical safeguarding of persons and property from hazards arising from exposure to lightning.

1.06 QUALITY ASSURANCE

- A. The Lightning Protection System shall be installed by an accredited installer of a manufacturer of Underwriters' Laboratories listed materials, and in conformance with standards set forth by the specified references.
- B. Lightning rods shall meet OSHA's personnel implement protection requirement known as OSHA 1926.701 (b) and meet or exceed NFPA 780 (2008), UL 96A and LPI requirements.

1.07 REFERENCES

- 1. NFPA 780, "Standard for the Installation of Lightning Protection Systems"
- 2. UL 96A, "Master Labeled Lightning Protection Systems".

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1.08 SUBMITTALS

1. Submit shop drawings and product data in accordance with Section 26 05 00.
 - a. Shop drawings shall include:
 - 1) Scale drawing of complete Lightning Protection System showing all air terminals, conductors, ground terminals, interconnecting conductors, arresters, and other connectors or fittings required to complete the system. Drawings shall include bonding and grounding of all metallic bodies of conductance and inductance, soil vent pipes, masts, and grounding system grids. Drawings shall include, but are not limited to, all rods and points shown or referenced on the architectural drawings, which do not necessarily include all required Lightning Protection System components.
 - 2) As-Built Drawings of the complete Lightning Protection System.
 - (a) Product Data: Submit application, technical, and installation data.
2. Submit configuration details and ground resistance test reports for all ground points. Ground tests shall be performed with all building components disconnected from the ground points under test.

1.09 WARRANTY

1. The Master Label of Approval from Underwriters' Laboratories shall be furnished to the Owner, upon completion of the installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

1. Lightning Protection Systems by Loehr Lightning Protection Co., VFC Lightning Protection Co., Inc., Modern Lightning Protection Co., Inc., or Robbins Lightning Protection, Inc.

2.02 MATERIALS AND ACCESSORIES S

1. The Lightning Protection Equipment shall be manufactured and labeled under the factory inspection program of Underwriters' Laboratories, Inc.
2. Materials shall be Class I for protection of ordinary buildings and structures not exceeding 75 feet in height.
3. Precautions shall be taken to provide against any tendency towards deterioration due to local conditions. Where any part of a copper protective system is exposed to the direct action of exhaust gases or other corrosive gases, it shall be protected by a continuous hot dip coating of lead. Such a coating shall extend at least 2 ft. (0.6m) below the top of the chimney.
4. Connectors and fittings shall be suitable for use with the conductor and the surfaces on which they are installed. Bimetallic connectors and fittings shall be used for splicing or bonding dissimilar metals.

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PART 3 EXECUTION

3.01 INSTALLATION

1. Conductors shall be copper, sized in accordance with NFPA 780.
2. Splices, connectors, clamps, bases, bonding fixtures, and other miscellaneous material shall be as recommended by the manufacturer, shall be of substantial construction, and of material electrolytically compatible with the conductor and mounting surface.
3. Where any part of a protection system is exposed to mechanical injury, it shall be protected by covering it with molding or tubing. If ferrous metal pipe or tubing is used around the conductor, the conductor shall be electrically connected to the pipe or tubing at both ends.
4. Constrain conductors at least every three feet.
5. Bimetallic connectors shall be used for splicing or bonding dissimilar metals.
6. If required, aluminum joint compound shall be Thomas and Betts Catalog No. 21059.
7. Avoid penetration of roofing materials by fastening devices. When roof penetration is unavoidable, obtain Architect/Engineer's specific approval of the fastening method prior to installation.
8. Air terminals shall be uniformly and symmetrically positioned. The air terminals shall have a cast bronze mushroom type cap with a safety yellow or orange extension rod and a safety spring adapter for additional implement protection. This adaptation shall meet OSHA 1926.701 (b) requirements.
9. All portions of the systems shall be concealed except for the points of the air terminals. The Contractor shall schedule and coordinate his work so that the concealed components may be properly installed, or provided to other trades for building-in when required.
10. Down connectors shall be installed in non metallic (PVC) conduits concealed in the air space or chase space between the interior and exterior walls. Division 26 shall provide all PVC conduits required by the lightning protection system trade for installation of ground cabling through the building. Conduits shall be installed on the interior of the building located and sized per the requirements of the lightning protection system trade.
11. System shall be bonded to the building grounding electrode system (BGES) and other system grounds as required.

3.02 FIELD QUALITY CONTROL

1. Technical Assistance: Manufacturer's representative shall generally supervise installation of this equipment with the Contractors concerned, providing up to five days of job supervision at various intervals during the job.
2. Testing/Evaluation: Manufacturer shall fully test and/or evaluate completed system including ground resistance level, equipment grounding, surge suppression, etc.

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3. Resistances of ground points and grids shall be recorded and submitted to Architect/Engineer.
4. Verification: Upon completion of the Lightning Protection System the Contractor shall submit the Master Label of Approval from Underwriters' Laboratories to Owner.

END OF SECTION

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SECTION 26 43 00 - SURGE PROTECTIVE DEVICE (SPD)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI C84.1 - American National Standard for Electric Power Systems and Equipment -- Voltage Ratings (60 Hz); 2020 (Reaffirmed 2025).
- B. ISO 9001 - Quality management systems -- Requirements; 2015.
- C. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.
- D. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.
- E. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

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.

1.03 WORK INCLUDED

- A. Surge Protective Devices
 - 1. Service Entrance, SPD-#1

1.04 RELATED WORK

- A. Section 26 05 53 – Identification for Electrical Systems
- B. Section 26 24 16 – Panelboards
- C. Section 26 27 13 - Electric Service

1.05 DESCRIPTION

- A. General. The SPDs shall be a hybrid high-energy power conditioning filter incorporating Surge Protective Device and high-frequency electrical line noise filtering. The specified unit shall provide effective high-energy transient voltage suppression, surge current diversion, high-frequency attenuation, and line control in ANSI/IEEE C62.41-1991 environments connected on the load side of the facility's electrical distribution system as indicated. The unit shall be connected in parallel with the facility's wiring system.
- B. Parameters: The SPDs shall meet or exceed the following electrical parameters.
 - 1. Unit Operating Voltage: The nominal unit operating voltage and configuration shall be as determined from the parameters of the circuit to which the SPD is connected on the drawings.

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2. Maximum Continuous Operating Voltage (MCOV): The maximum continuous operating voltage of all suppression components utilized in the unit shall not be less than 125% of the facility's nominal operating voltage for 120 volt nominal systems and not less than 115% of the facility's nominal operating voltage for 480 volt nominal systems.
3. Operating Frequency: The operating frequency range of the unit shall be 47 to 63 Hz.
4. Protection Modes: The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated in the table below:

VOLTAGE CONFIGURATION	MODES OF PROTECTION			
	L-N	N-G	L-G	L-L
WYE	☐	☐	☐	☐
DELTA	N/A	N/A	☐	☐

- a. ANSI/UL 1449 3rd Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

VOLTAGE CONFIGURATION	VPR RATING			
	L-N	N-G	L-G	L-L
208Y/120V	700V	700V	700V	1200V

5. Minimum Repetitive Surge Current Capacity: The specified SPD shall be capable of withstanding >5,000 category "C.3" impulses (per mode) without failure.
6. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.
7. Rated Single Pulse Surge Capacity: The rated single pulse surge current capacity, in amps shall be no less than 120 kA per mode or 240 kA per phase for SPD-#1.

C. Overcurrent Protection

1. The unit shall contain thermally protected metal-oxide varistors (MOVs). These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect any MOV from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.
2. All fuses and overcurrent/fault current protection devices shall consist of self-arch-quenching, sand-encapsulated UL 248-1 recognized fuse arrays. Each fuse shall be individually sealed in a manner that eliminates cross arching.
3. The device shall be capable of withstanding the full single pulse surge current capacity for every mode without the operation or failure of overcurrent/fault current protection or fuses.

- D. Transient Conduction Path: All full magnitude transient currents shall be conducted on low-impedance solid copper bussing. If printed circuit boards are utilized in surge current paths, no

single trace shall be allowed to conduct more than the proportional current share of the connected SPD component.

E. Environmental Requirements:

1. Storage Temperature and Operating Temperature: Ranges shall be -40° to +85°C (-40° to +185°F).
2. Relative Humidity: Operation shall be reliable in an environment with 5% to 95% non-condensing relative humidity.
3. Operating Altitude: The unit shall be capable of operation in altitudes up to 13,000 feet above sea level.
4. Audible Noise: The unit shall not generate any audible noise.
5. Magnetic Fields: No appreciable magnetic fields shall be generated. Unit shall be capable of use directly in Computer Rooms in any location without danger to data storage systems or devices.

a. QUALITY ASSURANCE

- F. Source Quality Control: Materials and equipment shall be new, unused and UL listed for use as a SPD.
- G. The SPD shall be supplied by a USA manufacturer of established reputation and experience who shall have produced similar apparatus for a period of at least ten (10) years and who shall be able to refer to similar installations rendering satisfactory service. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- H. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- I. For the equipment specified herein, the manufacturer's facility shall be ISO 9001 or 9002 certified.
- J. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.06 REFERENCES

A. Standards:

1. The SPD shall be designed, manufactured, tested and installed in compliance with the following:
 - a. Underwriters Laboratories -- most current revisions UL 1449 and UL 1283
 - b. National Fire Protection Association (NFPA-70, 75 and 78).
 - c. American National Standards Institute (ANSI).

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- d. Institute of Electrical and Electronics Engineers (ANSI/IEEE C62.41-1991, Categories A, Band C3 and C62.45-1987).
- e. National Electrical Manufacturers Association (NEMA).
- f. ANSI/IEEE Std. 1100-1999 Section 8.6.1 (Emerald Book).
- g. ANSI C84.1, American National Standard for Electric Power Systems and Equipment – Voltage Ratings (60Hz).
- h. The unit shall be UL 1449 listed as a Surge Protection Device.

B. Testing:

- 1. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.
- 2. Nominal Discharge Current (In) – All SPDs applied to the distribution system shall have a 20kA In rating regardless of their SPD Type or operating voltage. SPDs having an In less than 20kA shall be rejected.
- 3. MCOV (Maximum Continuous Operating Voltage) Testing: Each unit shall be factory tested at the applicable MCOV to assure proper field operation.
- 4. Quality Assurance Testing. Each unit shall be thoroughly factory tested before shipment. Testing of each unit shall include, but shall not be limited to UL manufacturing and production-line tests, quality assurance checks, MCOV and clamping voltage verification tests.

1.07 SUBMITTALS

- A. Refer to Section 26 05 00 for submittal procedures.
- B. Shop drawings shall include:
 - 1. Scale drawing of enclosure and internal components.
 - 2. Internal wiring schematic.
 - 3. Roughing-in requirements.
- C. Product Data: Submit application, technical, and installation data.
- D. Refer to Section 26 05 00 for submittal procedures for Operation and Maintenance Manuals.
- E. Warranty Service:
 - 1. The manufacturer shall provide a full ten (10) year warranty from the date of shipment against any SPD part failure when installed in compliance with manufacturer's written instructions and any applicable national or local code.
 - 2. Refer to Section 26 05 00 for submission of warranty.

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3. SPDs shall have no serviceable parts. The SPD shall be replaced with a new SPD for approved warranty claims and expedited to ship within 48 hours of approval direct to customer's site.

PART 2 PRODUCTS S

2.01 MANUFACTURERS

- A. Surelogic (Square D) or acceptable equal by Liebert, Current Technology, APT, Thor Systems, Siemens, Eaton, or ABB only. No other SPD manufacturers will be considered or approved.
- B. Provide one (1) SPD-#1 unit for the main panelboard.

MATERIAL

- A. Suppression System: The SPD system shall include an engineered solid-state suppression system utilizing arrays of non-linear voltage dependent metal oxide varistors with similar operating characteristics. To maximize current density the device shall contain sufficient thermal mass allowing the device the ability to dissipate large amounts of average power that may be caused from sustained over-voltage events and voltage swells as well as repetitive transient impulses. The suppression system components shall optimally share surge currents in a seamless, low-stress manner assuring maximum performance and proven reliability. The suppression system shall not utilize silicon avalanche diodes (SADs) or other components which might short or crowbar the line, thus leading to interruption of normal power flow to or system upset of connected loads.
- B. High Frequency Extended Range Power Filter: The SPD system shall include a high frequency extended range power filter and shall be UL 1283 listed as an Electromagnetic Interference Filter. The filter shall reduce fast rise-time, high frequency, error-producing transients, and electrical line noise to harmless levels, thus eliminating disturbances which may lead to electronic system upset. The filter shall provide minimum noise attenuation as specified in section 2.10 of this specification.
- C. Internal Connections: All full magnitude transient currents shall be conducted utilizing low-impedance copper bus bars. No plug-in component modules or quick-disconnect terminals shall be used in surge current-carrying paths.
- D. Internal and External Mounting: This project is designed based on external mounting of SPDs. Contractor may choose to internally mount, however, the Contractor is responsible for insuring the expanded panelboard will fit in the space available. The internal SPD must also be provided with a disconnecting means that will allow the SPD to be taken out of service for maintenance without requiring shutdown of the entire panelboard. Internally mounted SPD shall be factory installed and certified by the switchgear manufacturer and shall in no way affect the U.L. listing of the switchgear. SPD shall meet all other requirements herein regardless of mounting.
- E. The SPD shall be provided with an integral monitoring option as specified below:
 1. Dual Form "C" Dry Contacts: The SPD system shall be provided with 2 sets of form "C" dry contacts (normally open and normally closed) to facilitate connection to a building management system or other remote monitoring system. The contacts shall be normally

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open or normally closed and shall change state upon failure of the suppression system or power loss in any of the phases. The contacts shall be optically isolated to insure transient energy does not "jump" over to the monitoring circuit.

2. Display Event Counter: The SPD system shall be provided with a display event counter that makes available the cumulative number of transients the device has been subjected to. The detection circuitry must be current sensing to eliminate erroneous counts that may be produced from stray voltages and noise signals, both conducted and radiated. The event counter shall have a ten year lithium battery to provide back-up in the event of a power outage or when the unit is disconnected for service.
3. Battery Powered Audible Alarm and LED Indicators: The SPD system shall be provided with a battery powered audible alarm that detects and provides notification of single or multiple phase failure of the suppression filter system. The alarm shall have a silence switch as well as a test switch for ensuring positive function and an alarm LED that illuminates when the alarm is disabled.

F. INTEGRAL DISCONNECT SWITCH:

1. The integral disconnect switch is required, unless a supply breaker is located in the adjacent panelboard or switchboard to provide an individual overcurrent protection and disconnecting means.
2. The integral disconnect switch shall disconnect all ungrounded circuit conductors from the distribution system to enable testing and maintenance without interruption to the facility's distribution system.
3. The switch shall be rated for 240VAC.
4. The integral disconnect switch shall be capable of withstanding the published maximum surge current magnitude without failure or damage to the switch.

PART 3 EXECUTION

4.01 INSTALLATION

- A. The SPD system along with the remote status alarm contacts shall be installed including all connections, at the location and as indicated on the drawings and wiring diagrams as specified herein, and in accordance with the accepted shop drawings, the manufacturer's instructions, and the manufacturer's standard specification and dimension sheets.
- B. The auxiliary dry-relay form C monitor contacts shall be connected to the local DDC (if DDC available) as an alarm point as required. Division 23 shall provide the wiring with Division 26 supervising the connection at the SPD. Division 26 shall provide a non-metallic conduit within the SPD enclosure for isolation.
- C. Each SPD unit shall be connected to its associated panelboard via the NEC Article 285 with voltage matching the service being protected. Circuit breakers, conduit and wiring for SPD units shall be provided at each location noted above.

FIELD QUALITY CONTROL

- A. Technical Assistance: The SPD manufacturer's representative shall generally supervise installation of this equipment with the installing contractors.

END OF SECTION

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SECTION 26 50 00 - LIGHTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Lighting Fixtures
- B. Emergency Battery Packs for LED Fixtures
- C. Mini-Inverters for LED Fixtures

1.03 RELATED WORK

- A. Division 9 – Finishes
- B. Section 26 05 00 – Common Work Results for Electrical
- C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
- D. Section 26 05 23 – Control Voltage Electrical Power Cables
- E. Section 26 05 26 – Grounding and Bonding For Electrical Systems
- F. Section 26 05 33 – Raceway and Boxes For Electrical Systems

1.04 REFERENCES

- A. The complete fixture and installation method including the lamps, fixture construction, ballast, sockets, wiring, raceway, suspension system, fixture environment shall be in accordance with:
 - 1. Uniform Statewide Building Code for the Commonwealth of Virginia.
 - 2. N.E.C.
 - 3. Fixture and application use listed by U.L. Inc.
 - 4. All above references shall be current issue in effect at time of bid.

1.05 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 26 05 00.
 - 1. Shop Drawings shall include:
 - a. Photometrics.
 - b. Dimensions.
 - c. Roughing-in requirements.

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2. Product Data: Submit application, technical, and installation data.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lighting Fixtures: Lighting fixture manufacturer's names and catalog numbers are noted on drawings and are used to designate the type, general design, size, quality, etc., of fixtures desired S.

B. Lamps:

1. LED: Lamps, with electronic drivers, as scheduled on the drawings.

C. Emergency Battery Packs for LED Fixtures S:

1. LED emergency battery packs shall be provided with designated fixtures where shown on the drawings. The battery packs shall be a model listed by the fixture manufacturer as approved for use with the fixture that provides the maximum available lumen output. The emergency battery pack shall be capable of operating for 90 minutes and operate independently of any switching or normal controls. The battery pack shall be factory installed and certified for use with the particular LED driver provided with the fixture by the fixture manufacturer. Remote mounting of battery pack shall only be performed where called for by the fixture manufacturer and in accordance with their directions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide lighting fixtures complete with all required lamps, plates, rings, hangers, trim and all accessories necessary for a complete and secure installation. Contractor shall verify that the lighting fixtures' voltage conforms with the installation, the designated circuit voltage and the lighting fixture schedule.

B. All fixtures shall be adequately supported by fixture studs, conduit stems, steel rods or bar hangers. Fixtures shall not be mounted to or suspended from any mechanical system unless otherwise indicated.

C. Before fixture order is placed, the Contractor will be responsible for checking type of ceiling in all spaces to determine if fixture type indicated is correct to fit ceiling encountered and if exposed fixture finish indicated is correct.

D. All recessed light fixtures mounted in lay-in ceilings shall be fastened to the adjacent T-bars by Caddy #515 fasteners or accepted equal. Support outlet boxes and fixtures from building structure independent of associated ceiling suspension system. Where a recessed 2' x 2' lay-in troffer is indicated, the Electrical Trade shall provide a minimum of two (2) auxiliary support wires at the diagonal corners of the recessed fixture. These auxiliary support wires shall be equal to or greater than the support wires for the ceiling system and capable of supporting the fixture if the ceiling system support wires were compromised. The auxiliary support wires shall

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attach directly to the fixture, at the fixture manufacturer's indicated locations. These wires shall be attached and supported from the structure in the same manner as the ceiling system support wires. Where support wires are attached to the structural steel above the ceiling system, utilize CADDY catalog number 4H24 flange clamps or equal at the point of attachment to the structural steel.

- E. Lighting fixtures are shown in mechanical and electrical rooms for quantity and approximate location only. Some lighting fixtures will have to be mounted below ducts and pipes or on walls. Where possible, fixture to be approximately 9'-0" above floor to bottom.
- F. Where an emergency battery pack is indicated, the charging circuit (unswitched lighting circuit) shall be connected on the local (circuit indicated on the drawings) unswitched lighting circuit controlling that fixture or fixture group.
- G. Exit signs shall be connected to the normal lighting circuit serving each area ahead of any controls (unswitched) unless shown otherwise.
- H. Battery packs shall be factory mounted where available or required by the fixture manufacturers. Remote mounted battery packs shall be located in an accessible location such as above an accessible ceiling or in electrical or mechanical rooms. They shall not be visible in normally occupied finished spaces.

END OF SECTION

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SECTION 31 31 16 - TERMITE CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Chemical soil treatment.
- B. Site-applied termiticide for wood, steel, and concrete.

1.02 REFERENCE STANDARDS

- A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 2022.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- D. Test Reports: Indicate regulatory agency approval reports when required.
- E. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.
- F. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.
- G. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.
- H. Manufacturer's Instructions: Indicate caution requirement.
- I. Record and document moisture content of soil before application.
- J. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three (3) years of documented experience.
- K. Maintenance Data: Indicate re-treatment schedule and ____.
- L. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:
 - 1. Having minimum of three (3) years documented experience.
 - 2. Approved by manufacturer of treatment materials.
 - 3. Licensed in the State in which the Project is located.

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1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year installer's warranty against damage to building caused by termites.
 - 1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.

PART 2 PRODUCTS

2.01 CHEMICAL SOIL TREATMENT

- A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.
- B. Diluent: Recommended by toxicant manufacturer.
- C. Mixes: Mix toxicant to manufacturer's instructions.

2.02 SITE-APPLIED TERMITICIDE

- A. 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.
 - 1. Active Ingredient: 40% minimum disodium octaborate tetrahydrate (DOT).
 - 2. Carrier and Penetrant: Proprietary glycol solution.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

3.02 APPLICATION - CHEMICAL TREATMENT

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
 - 1. Under Slabs-on-Grade.
 - 2. At Both Sides of Foundation Surface.
 - 3. Soil Within 10 feet of Building Perimeter For a Depth of ____ feet.
- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.

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- F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- G. Re-treat disturbed treated soil with same toxicant as original treatment.
- H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 INSTALLATION - SITE-APPLIED TERMITICIDE

- A. Comply with manufacturer's written instructions.

3.04 PROTECTION

- A. Do not permit soil grading over treated work.
- B. Protect sheet materials from damage after completed installation. Repair damage with manufacturer's recommended products and according to the manufacturer's written instructions.

END OF SECTION