

PROJECT MANUAL

ASHVILLE FIRE STATION NO. 2

Ashville, Alabama

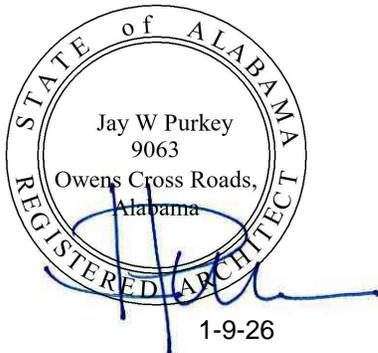
for

City of Ashville Fire Station

(Local Funds)

January 9, 2026

ISSUE FOR BID



Prepared By

GMC

Goodwyn Mills Cawood, LLC.
117 Jefferson St N.
Huntsville, AL 35801
T 256.539.3431
www.gmcnetwork.com

GMC PROJECT NUMBER: AHUN250003

**SECTION 000103
PROJECT DIRECTORY**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 OWNER:

- A. Name: City of Ashville Fir
1. City of Ashville Fire Department.
 2. 222 7th Avenue.
 3. City: Ashville.
 4. State: Alabama.
 5. Telephone: (205) 594-5186.
- B. Primary Contact: All correspondence from the Contractor to the Architect will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
1. Title: Chief.
 2. Name: Mike Berry.
 3. Email: cityofashville@gmail.com.

1.03 CONSULTANTS:

- A. Architect: Design Professional of Record. All correspondence from the Contractor regarding construction documents authored by Architect's consultants will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
1. Company Name: Goodwyn Mills Cawood.
 - a. 117 Jefferson St N.
 - b. Huntsville, AL 35801.
 - c. Telephone: (256) 539-3431.
 2. Primary Contact:
 - a. Title: Office Lead.
 - b. Name: Jay Purkey, AIA.
 - c. Email: jay.purkey@gmcnetwork.com.
- B. Civil Engineering Consultant:
1. Company Name: Shoal Engineering.
 - a. 101 Washington Street SE.
 - b. Huntsville, AL 35801.
 - c. Telephone: (256) 539.1221 .
 2. Primary Contact:
 - a. Title: Project Civil Engineer.
 - b. Name: James Garner.
 - c. Email: jgarner@schoel.com.
- C. Structural Engineering Consultant:
1. Company Name: Structural Design Group.
 - a. 300 Chase Park S #125.
 - b. Hoover, AL 35244.
 - c. Telephone: (205) 824-5200.
 2. Primary Contact:
 - a. Title: Principal/Vice President.
 - b. Name: Craig Winn, PE.

- c. Email: cwinn@sdg-us.com.
- D. Mechanical Engineering Consultant - Plumbing/HVAC:
 - 1. Company Name: Rocket MEP.
 - a. 1300 Meridian St, Ste. 302.
 - b. Huntsville, AL 35801.
 - c. Telephone: (256) 203-6373.
 - 2. Primary Contact:
 - a. Title: Director of Engineering.
 - b. Name: Andreas R. Haun, PE.
 - c. Email: Andreas@rocketmep.com.
- E. Electrical Engineering Consultant:
 - 1. Company Name: Rocket MEP.
 - a. 1300 Meridian St, Ste. 302.
 - b. Huntsville, AL 35801.
 - c. Telephone: (256) 203-6373.
 - 2. Primary Contact:
 - a. Title: _____.
 - b. Name: John Danilson, Jr. PE.
 - c. Email: John@rocketmep.com.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SEALS PAGE

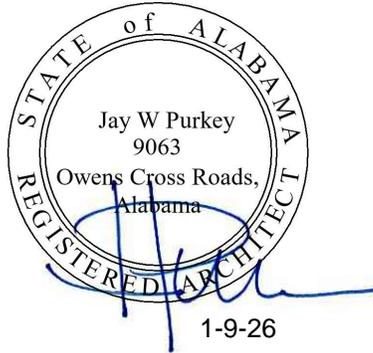
PART 1 - GENERAL

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

Goodwyn Mills Cawood, LLC
117 Jefferson St N
Huntsville, AL 35801

Jay Pukey, AIA
License No. 9063



B. Civil:

Schoel Co., Inc.
101 Washington St SE
Huntsville, AL 35801

Brett Wiseman, PE
License No. PE 23333



C. Structural:

Structural Design Group, Inc..
300 Chase Park S #125
Hoover, AL 35244

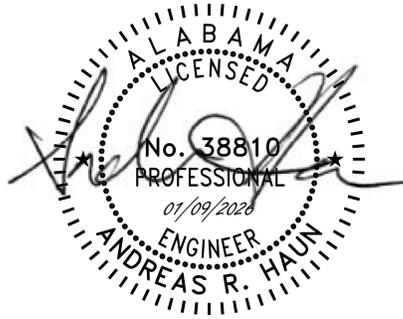
Craig Winn, PE
License No. 9063



D. Mechanical and Plumbing:

Rocket MEP
1300 Meridian St, Suite 302
Huntsville, AL 35801

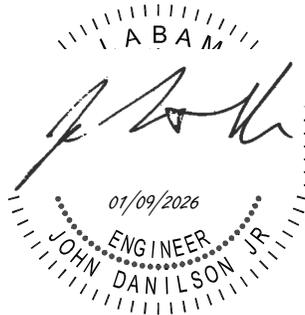
Andreas Haun, PE
License No. PE38810



E. Electrical:

Rocket MEP
1300 Meridian St, Suite 302
Huntsville, AL 35801

John Danilson, Jr. PE
License No. PE31453



END OF SECTION

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ADDITIONS TO A.I.A. INSTRUCTIONS TO BIDDERS

1.1 A.I.A. INSTRUCTIONS TO BIDDERS:

- A. Printed Form A701, "Instructions to Bidders", (1997 edition) issued by the American Institute of Architects, is part of these specifications as if written in full herein. A draft copy of this form is attached for reference. In case of conflict, these specifications take precedence over and modify aforesaid AIA Instructions to Bidders. Submission of a proposal will be evidence that the articles have been examined, read, and accepted as part of these contract documents, including the revisions as noted hereinafter.

1.2 ADDITIONS TO A.I.A. INSTRUCTIONS TO BIDDERS:

- A. In Article 3 – BIDDING DOCUMENTS, add the following:

"3.3 SUBSTITUTIONS

- a. Change paragraph 3.3.2 to allow requests for approval of substitution to be received by the Architect up to five (5) calendar days prior to bid date. Such requests for approval of substitutions shall include the completed Substitution Request Form, and the complete substitution package shall be submitted through a qualified General Contractor bidding the project, with his/her approval."

- B. In Article 4 - BIDDING PROCEDURES, add the following:

"4.5 PROPOSAL

- a. Proposal shall not contain any recapitulation of work to be done.
- b. Telegraphic modifications will be considered if received by the Owner before opening hour, provided a letter of confirmation is received by the Owner within 48 hours thereafter.
- c. Proposal shall be delivered enclosed in an opaque envelope marked "**ASHVILLE FIRE STATION NO. 2**", and shall bear the name and address of the bidder and their Alabama General Contractor License Number.
- d. Proposals shall be submitted on Proposal Forms provided; Numbers shall be both in writing and in figures. If words and figures conflict, the words shall govern. Addenda, if any, must be acknowledged. Signature shall be in long hand and in ink, and forms shall be complete without interlineation, alterations or erasures. Anyone signing proposal and contract as an agent of a firm or corporation shall present legal evidence of their authority.

4.6 CERTIFIED CHECKS OR BID BONDS

- a. Each proposal must be accompanied by a certified check or bid bond issued by an acceptable surety company for not less than 5% of the bid, but in no event more than \$10,000 made payable to the Owner, as a guarantee that the successful

Bidder will, within 10 days from receipt of notice to that effect, enter into a contract for performance of the work awarded to them. Proceeds of the check or Bid Bond will become property of the Owner if the bidder withdraws from competition after opening of bids or fails to execute the required contract or bonds, if their bid is accepted by Owner.”

- C. In Article 7 - PERFORMANCE BOND AND PAYMENT BOND, add the following:

“7.3 PERFORMANCE BOND AND PAYMENT BOND

7.3.1 Performance and Payment Bond equal to 100% of the contract price will be required of the Bidder to whom the contract or any part(s) of the contract is awarded. This bond must be acceptable to the Owner, and shall be attached (along with acceptable insurance certificate(s) in compliance with requirements) to each copy of the contract executed by the Contractor.

7.3.2 Performance Bond shall also extend as a maintenance bond for one year after the date of acceptance of the entire project. Said bond shall guarantee against defective materials and workmanship which may develop during that time, in any portion of the work included in the contract.

7.3.3 Performance Bond and Labor and Material Payment Bond shall be executed on AIA Document A312, copies of which are available for viewing in the office of the Architect, and which can be purchased from an AIA documents vendor by the Contractor and/or their surety.”

END OF ADDITIONS TO A.I.A. INSTRUCTIONS TO BIDDERS



AIA[®] Document A701[™] – 2018

Instructions to Bidders

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

THE OWNER:
(Name, legal status, address, and other information)

THE ARCHITECT:
(Name, legal status, address, and other information)

TABLE OF ARTICLES

- 1 **DEFINITIONS**
- 2 **BIDDER'S REPRESENTATIONS**
- 3 **BIDDING DOCUMENTS**
- 4 **BIDDING PROCEDURES**
- 5 **CONSIDERATION OF BIDS**
- 6 **POST-BID INFORMATION**
- 7 **PERFORMANCE BOND AND PAYMENT BOND**
- 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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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.

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.

§ 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 and who meets the requirements set forth in 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.

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;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 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 observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 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.

§ 3.1.5 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 Modification or Interpretation 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 at least seven days 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 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 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.

§ 3.3.4 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.

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

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 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.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain 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 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 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 the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, 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. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, 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.

§ 4.2.4 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, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Paper 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, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

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

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 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. Unless otherwise prohibited by law, 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.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

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 and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a 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, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. 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.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, 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 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.

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

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

- .5 Drawings

Number	Title	Date	
.6	Specifications		
	Section	Title	Date Pages
.7	Addenda:		
	Number	Date	Pages
.8	Other Exhibits: <i>(Check all boxes that apply and include appropriate information identifying the exhibit where required.)</i>		
	<input type="checkbox"/> AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below: <i>(Insert the date of the E204-2017.)</i>		
	<input type="checkbox"/> The Sustainability Plan:		
	Title	Date	Pages
	<input type="checkbox"/> Supplementary and other Conditions of the Contract:		
	Document	Title	Date Pages
.9	Other documents listed below: <i>(List here any additional documents that are intended to form part of the Proposed Contract Documents.)</i>		

Additions and Deletions Report for AIA[®] Document A701[™] – 2018

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 13:51:45 ET on 05/23/2019.

There are no differences.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, _____, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 13:51:45 ET on 05/23/2019 under Order No. 1831144354 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 2018, Instructions to Bidders, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)



STATE OF ALABAMA
BUILDING COMMISSION

770 WASHINGTON AVE
SUITE 444
Montgomery, Alabama 36130-1150
Telephone: (334) 242-4082
Fax: (334) 242-4182

ROBERT BENTLEY
Governor

Katherine Lynn
Director

October 28, 2013

TO: STATE AGENCIES, K-12 SUPERINTENDENTS, COMMUNITY COLLEGES, UNIVERSITIES

**FROM: KATHERINE LYNN, DIRECTOR
ALABAMA BUILDING COMMISSION**

SUBJECT: ACT 2013-205, CERTIFICATE OF EXEMPTION FROM SALES AND USE TAX FOR GOVERNMENTAL ENTITIES

Act 2013-205 was signed into law on May 9, 2013, granting the Alabama Department of Revenue (ADOR) the authority to issue certificates of exemption from sales and use taxes for construction projects for certain governmental agencies.

Summary

The full text of Act 2013-205 is available on the Building Commission's website at www.bc.alabama.gov. A brief summary of the Act is provided below:

- ADOR shall issue certificates of exemption from sales and use tax to governmental entities for each tax exempt project. Both the governmental entity and the contractor shall apply for certificates of exemption.
- Certificates of exemption shall only be issued for contracts entered into (awarded) on or after Jan. 1, 2014.
- Certificates shall only be issued to contractors licensed by the State Licensing Board for General Contractors or any subcontractor working under the same contract.
- Items eligible for exemption from sales and use tax are building materials, construction materials and supplies and other tangible personal property that become part of the structure per the written construction contract.
- ADOR will handle the administration of certificates of exemption and the accounting of exempt purchases. ADOR will have the ability to levy fines and may bar the issuance or use of certificates of exemption upon determination of willful misuse by the contractor or a subcontractor.
- The contractor shall account for the tax savings on the bid form.

Bidding of Projects Before Jan. 1, 2014

Projects bid before Jan 1, 2014 but awarded on or after Jan. 1, 2014 are still eligible for sales tax exemption regardless of whether the project was bid with or without sales tax. For projects bid before Jan. 1, 2014, the bid documents must specify if the contractor's bid shall or shall not include sales tax.

For projects bid before Jan. 1, 2014, if the project is bid with sales tax and the contractor and subcontractors purchase the materials tax exempt, prior to project closeout the contractor shall submit to the governmental entity a copy of the report filed with the Alabama Department of Revenue showing all exempt purchases. The actual sales tax savings indicated on the report shall be deducted from the final contract amount.

For projects bid after Jan. 1, 2014, the bid shall not include sales tax but the sales tax for the base bid and all bid items must be included on the contractor's bid proposal form. ABC Form C-3A indicates how the sales tax shall be accounted for on the bid proposal form and shall be modified by the project architect or engineer as appropriate for the bid items for each project. **Failure of the contractor to complete the attachment to the bid proposal form indicating the sales tax as required by Act 2013-205, Section 1 (g) shall render the bid non-responsive.**

Proposed Changes to Administrative Rules

Pursuant to Act 2013-205, the ADOR has proposed changes to the following administrative rules:

Rule 810-6-1-.46	Contractor's Liability
Rule 810-6-1-.46.01	Bleacher Systems, Lockers, Backstops, and Other Fixtures Installed in Gymnasiums
Rule 810-6-3-.77	Exemption for Certain Purchases by Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Governmental Entities

A link to the proposed rules and information about the public hearings can be found on ADOR's website at <http://www.revenue.alabama.gov/analysis/upcoming-rule-hearings.cfm> . All interested parties may present their views in writing to the **Secretary of the Alabama Department of Revenue, Room 4131, Gordon Persons Building, 50 N Ripley Street, Montgomery, Alabama 36132** at any time during the thirty-five (35) day period following publication of the notice or by appearing at the hearing.

If you have any questions, please feel free to contact Katherine Lynn at the Alabama Building Commission at (334) 242-4082 or the Alabama Department of Revenue at (334) 242-1170.

cc: Ms. Julie Magee, Commissioner, Alabama Department of Revenue
Mr. Ben Albritton, Assistant Attorney General

PROPOSAL FORM

To: CITY OF ASHVILLE Date: _____
(Awarding Authority)

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

(Legal Name of Bidder)

hereby proposes to furnish all labor and materials and perform all work required for the construction of **WORK:**
ASHVILLE FIRE STATION NO. 2 for the City of Ashville in accordance with Drawings and Specifications, dated
January 9, 2025, prepared by GOODWYN, MILLS & CAWOOD, LLC. (Architect's Project No. AHUN250003),
Architect/Engineer.

The Bidder, which is organized and existing under the laws of the State of _____,
having its principal offices in the City of _____,
is: a Corporation a Partnership an Individual (other) _____.

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

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

ADDENDA: The Bidder acknowledges receipt of Addenda No's. _____ through _____ inclusively.

BASE BID: For construction complete as shown and specified, the sum of:

Total Base Bid Sum

_____ Dollars (\$_____)

COMPLETION DATE: All Base Bid and any Alternate Work in the Contract shall be “Substantially Complete” within 450 consecutive days, from the date of the Owner’s written “Notice To Proceed”.

UNIT PRICES: Refer to “Attachment A to Proposal Form”
(Attachment A to Proposal Form DUE along with Proposal Form on Bid Date).

MAJOR SUBCONTRACTOR & SUPPLIER LISTING: Refer to “Attachment B to Proposal Form”
(DUE along with Proposal Form on Bid Date, or at Contractor’s option, turned in to the Owner within 24-hours after receipt of Bids, with a copy to the Architect).

NOTE THAT ALL SUBCONTRACTORS AND SUPPLIERS ARE SUBJECT TO APPROVAL BY THE OWNER.

ACCOUNTING OF SALES TAX: Refer to “Attachment C to Proposal Form”.
(DUE along with Proposal Form on Bid Date).

CHANGES IN WORK: Changes in the Work shall be addressed as described in General Conditions Article on Changes in the Work (and as modified by Supplementary Conditions).

IMMIGRATION STATUS VERIFICATION: Refer to “General Conditions” portion of the Project Manual.
(DUE along with Proposal Form on Bid Date.)

1. Executed E-VERIFY “Memorandum of Understanding”.

BID SECURITY: The undersigned agrees to enter into a Construction Contract and furnish the prescribed Performance and Payment Bonds and evidence of insurance within fifteen calendar days, or such other period stated in the Bid Documents, after the contract forms have been presented for signature, provided such presentation is made within 60 calendar days after the opening of bids, or such other period stated in the Bid Documents. As security for this condition, the undersigned further agrees that the funds represented by the Bid Bond (or cashier’s check) attached hereto may be called and paid into the account of the Awarding Authority as liquidated damages for failure to so comply.

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

Bid Bond, executed by _____ as Surety,

a cashier’s check on the _____ Bank of _____,

for the sum of _____ Dollars

(\$ _____) made payable to the Awarding Authority.

BIDDER’S ALABAMA LICENSE:

State License for General Contracting: _____
 License Number Contractor’s DUNS No. Bid Limit

 Type(s) of Work

/////////BIDDER’S FEDERAL CENTRAL CONTRACTING REGISTRATION (CCR)://///////

////Bidder’s “DUNS Number”: _____

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

The Bidder also declares that a list of all proposed major subcontractors and suppliers is included and attached to the Proposal Form, or will be turned in to the Owner within twenty-four (24) hours after receipt of bids, with a copy to the Architect.

Bidder certifies that vendors, subcontractors and affiliates, that make sales for delivery into Alabama or leases for use in Alabama are registered, collecting, and remitting Alabama state and local sales, use, and /or lease tax on all taxable sales and leases into Alabama. By submitting a proposal, contractor is hereby certifying that he and his company are in full compliance with Act No. 2006-557, and not barred from bidding or entering into a contract pursuant to 41-4-116 (Code of Alabama 1975), and acknowledge that the awarding authority may declare the contract void if the certification is false.

Legal Name of Bidder _____

Mailing Address _____

*** By (Legal Signature)** _____

* Name (type or print) _____ (Seal)

* Title _____

Telephone Number _____

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

END OF PROPOSAL FORM

CONTRACTOR

ATTACHMENT A
TO PROPOSAL FORM

1.1 UNIT PRICES:

- A. The undersigned proposes the following Unit Prices for additions to or deductions from the Work wherein Unit Prices are applicable as determined by the Architect and Owner. These Unit Prices include all charges for labor and materials, fee, layout, supervision (field and home office), general expenses, taxes, insurance, overhead and profit, for Unit Item of Work in place. The Contract sum shall be increased or decreased based upon quantity difference multiplied by the applicable Unit Price, in accordance with the General Conditions.
- B. Refer to Section 01 2200 - "Unit Prices", and to the respective sections of the Specifications for the complete Unit Price Item description.
- C. Submit the following Unit Prices with the Proposal Form on Bid Date.

ITEM DESCRIPTION:	UNIT:*	UNIT PRICE:
1. Mass Earth Excavation:	CY	\$ _____
2. Trench Earth Excavation:	CY	\$ _____
3. Hand Earth Excavation:	CY	\$ _____
4. Additional Soil:	CY	\$ _____
5. Rock, Masonry, or Concrete Excavation in Trenches/Pits:	CY	\$ _____
6. Sod:	SY	\$ _____
7. Undercut & Backfill – Building Control Area:	CY	\$ _____
8. Undercut & Backfill – Non-Building Control Area:	CY	\$ _____
9. Crushed Stone:	TN	\$ _____
10. Overhead Utility Relocation:	LF	\$ _____
11. Underground Utility Relocation:	LF	\$ _____
12. Concrete Sidewalk:	SF	\$ _____

13.	Painting (Wall):	SF	\$ _____
14.	Painting (Ceiling):	SF	\$ _____
15.	New Concrete Slab on Grade :	SF	\$ _____

(*)	Legend to "unit" quantity abbreviations:	CY	Per "Cubic Yard"
		SY	Per "Square Yard"
		TN	Per "Ton"
		SF	Per "Square Foot"
		LF	Per "Linear Foot"
		EA	Each

END OF ATTACHMENT A TO PROPOSAL FORM

CONTRACTOR

ATTACHMENT "B"
TO PROPOSAL FORM

1.1 SUBCONTRACTORS LISTING:

- A. Submit the following Subcontractors names with the Proposal Form by 2:00 PM local time on Bid Date, OR at Contractor’s option, turned in to the Owner within 24-hours after the time scheduled for the opening of Bids, with a copy to the Architect:**

SPECIFICATION SECTION:	PRINCIPAL SUBCONTRACTOR OR SUPPLIER - NAME and LOCATION:
SECTION 02 4100 - “DEMOLITION”:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)
SECTION 07 9005 - “JOINT SEALERS”:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)
SECTION 13 1100 - “SWIMMING POOL”:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)
SECTION 31 1000 - “SITE CLEARING”:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)
SECTION 31 2000 - “EARTH MOVING”:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)
SECTION 31 2316 - “TRENCHING”:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)

SECTION 32 000 - "CONCRETE":	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
SECTION 32 1123 - "AGGREGATE BASE COURSES":	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
SECTION 32 1750 - "CONCRETE CURB AND GUTTERS":	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
OTHER:	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
OTHER:	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
OTHER:	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
OTHER:	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
OTHER:	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)
OTHER:	_____; (FIRM NAME) _____. (LOCATION - CITY and STATE)

OTHER:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)
OTHER:	_____ (FIRM NAME) _____ (LOCATION - CITY and STATE)

This list is not necessarily all inclusive. Submit all primary subcontractors whether their trade is listed here or not.

END OF ATTACHMENT "B" TO PROPOSAL FORM

ACCOUNTING OF SALES TAX

Attachment to ABC Form C-3

Proposal Form

To: _____ Date: _____
(Awarding Authority)

NAME OF PROJECT _____

SALES TAX ACCOUNTING

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

ESTIMATED SALES TAX AMOUNT

BASE BID:\$ _____

Alternate No. 1 (.....) (add)(deduct) \$ _____
(Insert key word for Alternate)

Alternate No. 2 (.....) (add)(deduct) \$ _____

Alternate No. 3 (.....) (add)(deduct) \$ _____

Alternate No. 4 (.....) (add)(deduct) \$ _____

Alternate No. 5 (.....) (add)(deduct) \$ _____

Alternate No. 6 (.....) (add)(deduct) \$ _____

Alternate No. 7 (.....) (add)(deduct) \$ _____

Alternate No. 8 (.....) (add)(deduct) \$ _____

Alternate No. 9 (.....) (add)(deduct) \$ _____

Alternate No. 10 (.....) (add)(deduct) \$ _____

Alternate No. 11 (.....) (add)(deduct) \$ _____

Alternate No. 12 (.....) (add)(deduct) \$ _____

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

Legal Name of Bidder _____

Mailing Address _____

*** By (Legal Signature)** _____

*** Name (type or print)** _____

(Seal)

*** Title** _____

Telephone Number _____

IMMIGRATION STATUS VERIFICATION

1.1 GENERAL:

A. Bidders are hereby reminded that they are required to comply with requirements of Alabama Immigration Law, Act 2011-535 (also referred to as the “Beason-Hammon Alabama Taxpayer and Citizen Protection Act”, or H.B. 56). This Law was amended by Act No. 2012-491 and signed into law by the Governor May 18, 2012. The following requirements are in effect:

1. Contractors are required to enroll in the E-Verify program of the United States Department of Homeland Security and to provide documentation of enrollment in the E-Verify program with their contracts and agreements. E-Verify MOU shall be submitted with Proposal Form.
2. Statement of Compliance with Act No. 2012-491 shall be attached to Construction Contract, and shall include the following statement:

By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

B. Additional information and Guidance is available at the following websites:

1. E-Verify portal maintained by State of Alabama: <http://immigration.alabama.gov>
2. Alabama Department of Finance, Comptroller’s Website - Compliance Guidelines: <http://comptroller.alabama.gov/pdfs/Memos/2012-01-06%20Alabama%20Immigration%20Law.pdf>
3. Alabama Secretary of State’s Website: Including in part, rules and acceptable form for affidavits for business entities, employers, contractors, and subcontractors. <http://www.sos.state.al.us/>
4. Alabama Building Commission: <http://www.bc.state.al.us/Memo%20on%20Act%202011-535-Alabama%20Immigration%20Law-1-11-2012.pdf>
5. US Department of Homeland Security, E-Verify: www.dhs.gov/E-Verify

BID BOND FORM

- 1.1** Bid Bond shall be executed equivalent to AIA Document A310, Bid Bond. A draft copy is attached for reference. Copies of A310 are available for viewing in the office of the Architect, and may be purchased from an AIA documents vendor by the Contractor.

END OF BID BOND FORM

Bid Bond

CONTRACTOR:
(Name, legal status and address)

<< >>< >>
<< >>

SURETY:
(Name, legal status and principal place of business)

<< >>< >>
<< >>

OWNER:
(Name, legal status and address)

<< >>< >>
<< >>

BOND AMOUNT: \$ << >>

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

<< . >>
<< >>
<< >>

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.

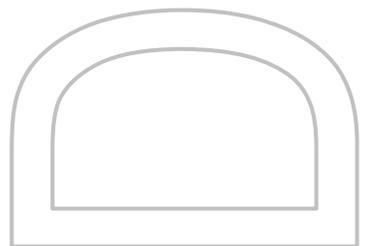
When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement 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.



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.

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

(Witness)

(Witness)

« »

(Principal) (Seal)

« »

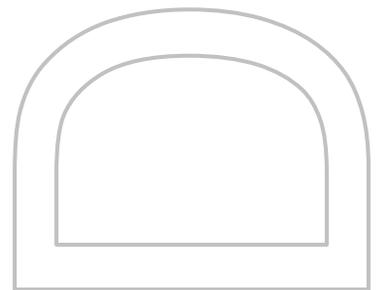
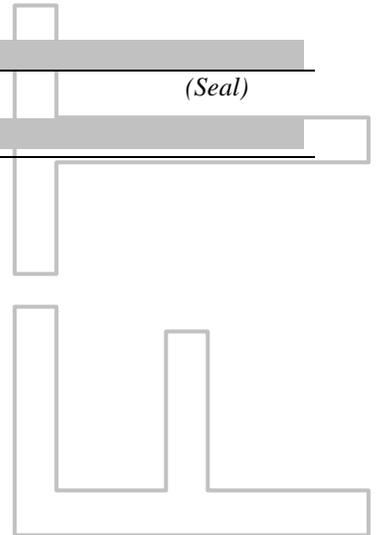
(Title)

« »

(Surety) (Seal)

« »

(Title)



CONSTRUCTION CONTRACT FORM

- 1.1** The Construction Agreement shall be executed on A.I.A. Document A101 - 2017 Edition, a copy of which is attached for reference. Copies are available for viewing in the office of the Architect, and may be purchased from an A.I.A. documents vendor by the Contractor.

END OF CONSTRUCTION CONTRACT FORM

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 day of in the year
(In words, indicate day, month and year.)

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

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

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

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

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	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.)

« »

§ 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.)

« »

§ 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)

PERFORMANCE BOND AND PAYMENT BOND FORM

- 1.1 Performance and Payment Bond shall be provided for 100% of the Contract amount, and shall be executed on AIA Document A312, latest edition. A draft of AIA Document A312 – 2010 is attached. Copies of document are available for viewing in the office of the Architect, and can be purchased from an AIA documents vendor by the Contractor and/or their surety.

END OF PERFORMANCE BOND AND PAYMENT BOND FORM

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)

« »
« »

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

« . »
« »

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »

Title:

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

Signature:

Name and « »

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

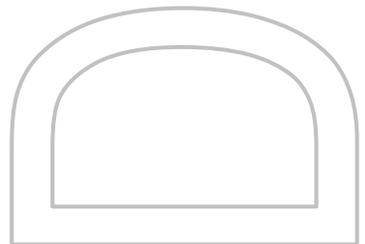
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ADDITIONS AND DELETIONS:

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 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)

SURETY

Company:

(Corporate Seal)

Signature:

Name and Title:

Address:

« »« »

« »

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)

« »
« »

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

« . »
« »

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond: None See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »

Title:

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

Signature:

Name and « »

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

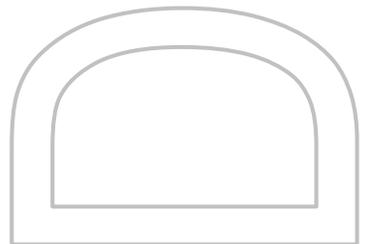
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ADDITIONS AND DELETIONS:

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 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 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.

§ 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

SURETY

Company:

(Corporate Seal)

Company:

(Corporate Seal)

Signature:

Signature:

Name and Title:

<< >><< >>

Name and Title:

<< >><< >>

Address:

<< >>

Address:

<< >>

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- 1.1 The “General Conditions of the Contract for Construction,” A.I.A. Document A201, 2017 Edition, (also referred to as “General Conditions”, “Conditions of the Contract”, etc.), Articles 1 through 15, inclusive, is a part of this contract, and is incorporated herein as fully as if here set forth.
- 1.2 Copies of A.I.A. Document A201 are available for viewing in the office of the Architect, and can be purchased from an A.I.A. documents vendor by the Contractor.
- 1.3 See “Supplementary Conditions” and “Special Conditions” for supplements which modify, change, delete, and/or add to the General Conditions.
- 1.4 A draft copy of A201 – 2017 is attached for reference.

END OF GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

DRAFT AIA® Document A201™ - 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

<< >>
<< >>

THE OWNER:
(Name, legal status and address)

<< >>< >>
<< >>

THE ARCHITECT:
(Name, legal status and address)

<< >>< >>
<< >>

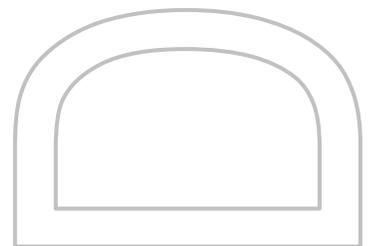
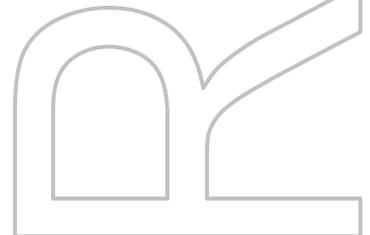
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- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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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), 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 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.

§ 1.2 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.

§ 1.2.2 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.

§ 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. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 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.

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.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and 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. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 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 copy of the Contract Documents for 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 repeatedly 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.

§ 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. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval 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. 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.

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 generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements 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.

§ 3.2.4 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 those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 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.

§ 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.

§ 3.4.2 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.

§ 3.4.3 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.

§ 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 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 knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate 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 Architect will promptly investigate such conditions and, if the Architect 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 recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party 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.

§ 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.

§ 3.10 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.

§ 3.11 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.

§ 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 approval 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 not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless 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 specifically 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.

§ 3.12.10.2 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.

§ 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.

§ 3.15 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.

§ 3.16 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), but only to the extent caused 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 that 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, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 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 generally 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.

§ 4.2.3 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.

§ 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. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 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. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 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, as soon as practicable 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. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity 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.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely 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. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect 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.

§ 5.4 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 Contractor; 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.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 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. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

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 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 the Architect will allocate the cost among those responsible.

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.

§ 7.2 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 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.

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

§ 7.3.3 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 judgment, 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 either party to disagree and 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.

§ 7.4 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. 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.

§ 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 and Owner.

§ 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 delay authorized by the Owner pending mediation and binding dispute resolution; or (5) 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.

§ 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.

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.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 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, unless objected to by the Architect, 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 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.

§ 9.3.2 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.

§ 9.3.3 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 accordance 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 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 for which the Contractor is responsible, 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, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 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 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 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 or awarded by binding dispute resolution, 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. 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 for in the Contract Documents.

§ 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.

§ 9.8.2 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.

§ 9.8.4 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.

§ 9.9 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.

§ 9.10.2 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. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final 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.

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.

§ 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 Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. 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 and Architect.

§ 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 21 days after discovery. 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. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, 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 in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, 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), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 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.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 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 jurisdiction where the Project is located. 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.

§ 11.1.2 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. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 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 Insurance

§ 11.2.1 The Owner 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 Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to

provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 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. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (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 Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 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.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 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. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 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.

§ 11.5.2 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 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 accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, 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.

§ 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 promptly 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 Interest

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

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;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, 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, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 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~~Suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, 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 certified by the Initial Decision Maker, 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.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 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 one of the parties 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 between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. 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 requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive 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.

§ 15.1.3.2 Claims by either the Owner or Contractor, 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, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 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 Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 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.

§ 15.1.7 Waiver of Claims for Consequential Damages

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

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .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 mutual waiver is applicable, without limitation, to all consequential damages due to either party'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 Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker

and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker 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 Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker 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 Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker 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 Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 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.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTARY CONDITIONS

1.1 GENERAL CONDITIONS:

- A. The “General Conditions of the Contract for Construction”, AIA Document A201, 2017 Edition, Articles 1 through 15, inclusive, (General Conditions or Conditions of the Contract hereinafter) is a part of this contract, and is incorporated herein as fully as if here set forth.

2.2 SUPPLEMENTS:

- A. The following supplements, modify, change, delete or add to the General Conditions. Where any part of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered provisions of that part shall remain in effect.

1. ARTICLE 1 - GENERAL PROVISIONS:

- a. Add the following new subparagraph:

“1.5.3 Any written permission given for use of the Drawings, Specifications, and/or other Documents prepared by the Architect and/or the Architect’s consultants which is provided under the terms of this Article, shall require and be subject to payment to the Architect for such use, as determined to be equitable by the Architect or as mutually agreed in writing between the Architect and the party or parties requesting and receiving permission for any such use.”

- b. Add the following new Subparagraphs:

1.6.1 The Architect may, with the concurrence of the Owner, furnish to the Contractor versions of Instruments of Service in electronic form. The Contract Documents executed or identified in accordance with Subparagraph 1.1.1 shall prevail in case of an inconsistency with subsequent versions made through manipulatable and/or non-manipulatable electronic operations involving computers.

1.6.2 The Contractor shall not transfer or reuse Instruments of Service in electronic or machine readable form without the prior written consent of the Architect, and payment to the Architect in amount(s) agreeable to the Architect for such use.

1.6.3 Representatives of the Owner, Contractor, and/or Architect shall meet periodically, if required by the Owner or Architect, at mutually agreed-upon intervals for the purpose of establishing procedures to facilitate cooperation, communication and timely responses among the participants. By participating in this arrangement, the parties do not intend to nor will they create additional contractual obligations or modify the legal relationships which may otherwise exist.”

2. ARTICLE 2 - OWNER:

- a. Refer to Paragraph 2.2.2, and add the following new Subparagraphs:

2.2.2.1 The Contractor shall secure and pay for all necessary permits, fees, etc., as necessary for the execution and completion of the Work of the project, unless specifically indicated otherwise within the Bid and Contract Documents; Which shall include in part, building permit, inspection fees, utility connection fees, utility impact fees, licenses, and other charges which may be applicable and/or due at the time when bids were received or negotiations concluded.

2.2.2.2 Unless specifically indicated otherwise on the Drawings or in the Project Manual, the Owner will furnish all necessary Environmental and Storm Water permits customarily required for this type of project; The Contractor shall comply with the requirements and directions of the Owner and/or imposed on the Owner for compliance with these requirements.

- b. Add the following new paragraph:

“2.2.5 The Contractor will make these documents available in electronic format (PDF) for subcontractors to download.”

3. ARTICLE 3 - CONTRACTOR:

- a. Refer to Paragraph 3.2, and add the following new Subparagraph:

“3.2.5 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 Project correspondence and/or documentation.”

- b. Refer to Paragraph 3.3, and add the following new Subparagraph:

“3.3.4 The Contractor shall lay out their own work. They shall be responsible for all work executed by them under the Contract which shall be constructed to the lines and grades as shown on the Drawings. They shall verify all figures and elevations before proceeding with the work, and will be held responsible for any error resulting from failures to do so.”

- c. Delete Paragraph 3.4.2, and substitute the following:

“3.4.2 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified, only under the conditions set forth in the General Requirements (Division 1 of Specifications). By making requests for substitutions, the Contractor:

3.4.2.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equivalent to or superior in all respects to that specified;

3.4.2.2 represents that the Contractor will provide at least the same warranty for the substitution that the Contractor would for that specified;

3.4.2.3 certifies that the cost data presented is complete and includes all related costs under this Contract, except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

3.4.2.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects."

- d. Add the following new Subparagraph:

"3.4.4 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions, regardless of whether or not the proposed substitution is subsequently accepted by the Owner and/or Architect, and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions."

- e. Revise the following Subparagraphs:

Before the semicolon at the end of Subparagraph 3.8.2.2, add the following:

“, except that if installation is included as part of an allowance in Divisions 1-16 of the Specifications, the installation and labor cost for greater or lesser quantities of Work shall be determined in accordance with Subparagraph 7.3.7, unless specifically indicated otherwise;”

Refer to Subparagraph 3.8.2.2, and add the following after the word “profit”:
“, temporary storage,”

Refer to Subparagraph 3.8.2.3, and add the following phrase at the end:

“, which could not reasonably be anticipated by the Contractor at the time of bidding, and/or which are not due to any cause or delay by the Contractor, and/or which are due to causes over which the Contractor had no control.”

- f. Refer to Subparagraph 3.9.2, and add the following new Subparagraphs:

“3.9.2.1 Contractor's Superintendent shall be properly qualified and have a minimum of five (5) years experience as superintendent for this Contractor. Contractor shall furnish within five days of their receipt of the Contract, records of proposed Superintendent's education and experience, construction project experience and in what capacities, names of architects for these projects, and

information sufficient to determine suitability for the proposed position for this project.

3.9.2.2 Refer to Division 1 Section “Special Conditions”, and individual specifications sections throughout the Project Manual, for additional information and minimum experience requirements.”

- g. Refer to Subparagraph 3.10.3, and add the following at the end:

“If the project is behind the Construction Schedule, the Contractor shall act on each portion which is not in general accordance with the Construction Schedule, to whatever extent is required to move progress of the Work back into general accordance with the Construction Schedule, at no additional cost to the Owner.”

- h. Refer to Subparagraph 3.12.7, and change the word “approved” to read “reviewed”.

- i. Refer to Subparagraphs 3.12.8 and 3.12.9, and revise the following:

Change the word “approved” to read “reviewed”, wherever it occurs.

Change the word “approval” to read “review”, wherever it occurs.

- j. Add the following new Subparagraph:

“3.12.11 The Architect’s review of Contractor’s submittals will be limited to examination of an initial submittal and ONE (1) resubmittal. The Architect’s review of additional submittals 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 due to the Architect for evaluation of such additional resubmittals.”

- k. Refer to Subparagraph 3.15.1, and add the following new Subparagraph:

“3.15.1.1 Remove broken or scratched glass and replace with new glass, remove paint droppings, spots, stains, and dirt from finished surfaces and exposed concrete, masonry, stucco, and similar surfaces, and clean plumbing fixtures, hardware, floors, and equipment. Contractor shall keep interior of the building free of stored or unattended combustible material.”

4. ARTICLE 4 - ADMINISTRATION OF THE CONTRACT:

- a. Refer to Subparagraph 4.2.7, and revise as follows:

In first sentence, after the word “approve”, add “and/or make comments,” .

In the last two sentences, change the word “approval”, to read “review and/or approval”.

- b. Refer to Subparagraph 4.2.9, and change the word “inspections”, to read “construction observations and final inspection(s)”.

5. ARTICLE 5 - SUBCONTRACTORS:

- a. Refer to Subparagraph 5.2.1, and add the following new Subparagraph:

“5.2.1.1 Submittal of list as required of the Contractor, shall include all major Subcontractors and Suppliers, and shall be submitted not later than, either along with the Contractor’s completed Proposal Form, or shall be submitted to the Owner, with copy to Architect, within 24-hours of the time and date that bids are scheduled to be opened. Refer to Division 1 Section “Special Conditions” for additional information and minimum requirements.”

6. ARTICLE 7 - CHANGES IN THE WORK:

- a. Refer to paragraph 7.2 Change Orders, and add the following new Subparagraph 7.2.2.

“7.2.2 Change Orders for this project shall have a total of 25% maximum mark-up if sub-contractor and general contractor are involved. Sub-contractor shall have 15% mark-up (10% to cover overhead such as insurance, bond, labor, labor burden, etc. and the remaining 5% for profit). Contractor shall have 10% mark-up (5% to cover all overhead as mentioned above under sub-contractor, and 5% for profit). If the general contractor self-performs the work then they shall be allowed 15% mark-up.

Should changes which will decrease the cost of the work be ordered by the Architect, then the Contract Price shall be reduced by an amount equal to the agreed estimated saving resulting from these changes, and further reduced by the Contractor’s and Subcontractor’s, if applicable, overhead and profit.

7. ARTICLE 8 - TIME:

- a. Refer to Subparagraph 8.1.2, and add the following new Subparagraph:

“8.1.2.1 The date of commencement shall be established as the earlier of either the date the Contractor receives the fully executed Contract, or the date indicated on the Owner’s written “Notice To Proceed”, unless mutually agreed otherwise and in writing between the Owner and the Contractor.”

- b. Refer to Subparagraph 8.2.2, and revise as follows:

At end of first sentence, omit the words “and Owner”.

8. ARTICLE 9 - PAYMENTS AND COMPLETION:

- a. Refer to Subparagraph 9.2, and change the word “Architect”, to read “Architect and/or Owner”, wherever it occurs.

- b. Refer to Subparagraph 9.3.1, and add the following sentence and new Subparagraphs:

“The form of Application of Payment, duly notarized, shall be a current authorized edition of AIA Document G702, or approved equivalent document, supported by a current authorized edition of AIA Document G703 or approved equivalent continuation sheet.

9.3.1.3 Until the Work is **100-percent complete**, the Owner shall pay **95-percent of the first 50-percent** of the amount due the Contractor on account of progress payments, **and no additional retainage thereafter**, except as otherwise provided. Unless for reasons otherwise provided in the Contract Documents, thereafter, there will be no further retainage withheld.

9.3.1.4 Upon completing all requirements to achieve Substantial Completion, as defined within the Contract Documents, the payment shall be sufficient to increase the total payments to **98-percent of the contract sum**, less such amounts as the Architect and/or Owner shall determine for all incomplete work and unsettled claims, except as otherwise provided.”

- c. Refer to Subparagraph 9.7, and revise as follows:

Change the word “seven”, to read “ten”, wherever it occurs.

Omit the last nine words, beginning with “, plus...” through the word “Documents”.

Add the following Sentence: “In the event it is deemed necessary by the Architect and/or Owner to return a request and/or requests for progress payment to the Contractor, the time limits indicated herein for payment shall begin from the date of receipt of a request for progress payment which is subsequently resubmitted, and found acceptable by the Architect and/or Owner.”

- d. Refer to Subparagraph 9.8.3, and add the following new Subparagraph:

“9.8.3.1 Except with the consent of the Owner, the Architect will perform no more than one (1) inspection and one (1) reinspection 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 and/or re-inspections due to incomplete work and/or unsettled claims.”

- e. Refer to Subparagraph 9.8.5, delete the second sentence, and substitute the following:

“Upon such acceptance and consent of surety, if any, the Owner shall make payment sufficient to increase the total payments to 98-percent (98%) of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work and unsettled claims.”

- f. Refer to Subparagraph 9.10.1, and add the following new Subparagraph:

“9.10.1.1 Except with the consent of the Owner, the Architect will perform no more than one (1) inspection and one (1) reinspection 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 and/or re-inspections due to incomplete work, unsettled claims and/or other cause or causes attributable to the responsibilities of the Contractor.”

9. ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY:

- a. Refer to Subparagraph 10.1, and add the following:

“In performing this work, the Contractor shall in part, take all necessary precautions for ample protection of personnel, property, and equipment from falling debris, dust, or undue exposure to weather. The safety provisions of applicable laws, building and construction codes shall be observed and applicable provisions of the latest edition of the AGC “Manual of Accident Prevention” shall be adhered to and followed. All passageways, guard fences, lights and other facilities required for protection of the public and workmen shall be provided and maintained.”

10. ARTICLE 11 - INSURANCE AND BONDS:

- a. Delete Paragraphs 11.2, 11.3, and 11.4, and replace with the following:

“11.2 CONTRACTOR’S AND SUBCONTRACTOR’S MINIMUM LIABILITY INSURANCE:

11.2.1 The insurance required by Subparagraph 11.1 shall be written for not less than the following minimum limits of liability, or greater if required by law. **Additionally named primary insureds shall be “the Owner, Architect, and their Consultants”, except not on Worker's Compensation; all insurance certificates shall provide for “Waiver of Subrogation” against “the Owner, Architect, and their Consultants”, by the Contractor, each Subcontractor, and their insurers.** Refer also to Division 1 Section “Special Conditions”, for additional information and requirements.

11.2.2 **MINIMUM COVERAGE(S) REQUIRED:**

11.2.2.1 **Workers' Compensation:**

a.	State	Statutory
b.	Applicable Federal	Statutory
c.	Employer's Liability	\$1,000,000
d.	Benefits Required by Union Labor Requirements	As applicable.
e.	Voluntary Compensation	\$1,000,000

- f. Broad Form all states Endorsement.

11.2.2.2 Comprehensive General Liability:

- a. Including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage; Contractual Liability; Personal Injury; all as combined single limits:

1) General Aggregate: \$3,000,000, with general aggregate of \$3,000,000 applicable to this project only; including in part, Bodily Injury/Property Damage \$1,000,000 each occurrence.

2) Products/Completed Operations: \$3,000,000 annual aggregate.

Products and Completed Operations Insurance shall be maintained for three (3) years after the work has been completed; property damage liability insurance shall provide X, C, and U coverage; Fellow Employee suits shall be included.

3) Personal and Advertising Injury: \$1,000,000 per occurrence.

4) Each Occurrence: \$1,000,000.

11.2.2.3 Comprehensive Commercial Business Automobile Liability (owned, non-owned, hired):

- a. Combined single limits for bodily injury and property damage:
- 1) Bodily Injury/Property Damage \$3,000,000 each occurrence.

11.2.2.4 Aircraft Liability (owned and non-owned) when applicable:

- a. Furnish proof of coverage with the following limits (combined single limits for bodily injury and property damage):
- 1) Admitted liability \$1,000,000 per seat.
- 2) Bodily Injury/Property damage \$1,000,000 each occurrence.

11.2.2.5 Commercial Umbrella Excess Liability over Primary Insurance:

- a. \$4,000,000 each occurrence.
- b. Products/Completed Operations: \$4,000,000 aggregate.

- c. General Aggregate: \$4,000,000.

11.2.2.6 Indemnity:

- a. The Contractor shall assume all liability for and shall indemnify and save harmless the Owners, Architect, and their consultants and employees from: All damages and liability for injury to any person or persons, and injury to or destruction of property, including the loss of use thereof, by reason of an accident or occurrence arising from operations under the Contract, whether such operations be by himself, or by any subcontractor or by anyone directly or indirectly employed by either of them, occurring on or about the premises or the ways and means immediately adjacent, during the term of the contract, or any extension thereof, and shall also assume the liability for injury and/or damages to adjacent or neighboring property by reason of work done under this Contract; The obligations of the work done under this Contract. The obligations of the contractor under this paragraph shall not extend to the liability of the Architect, his agents or employees arising out of:

- 1) The preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, design or specifications, or;
- 2) The giving or the failure to give directions or instructions by the Architect, his agents or employees, upon request, provided such giving of or failure to give is the primary cause of the injury or damage.

The insurance shall extend to and include all of the contractor's operations, regardless of whether they may be in connection with work that is temporary, permanent, included in any of the bid items or classified as extra work.

A statement of the above indemnity coverage and condition shall be included on the Insurance Certificate or Policy.

11.2.2.7 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to signing of the Contract for the Work of this project, and along with the required 100% Performance and 100% Payment Bonds (100% of Contract amount), shall be attached to the Contract(s). These certificates shall contain a provision that policy coverage will not be changed or canceled until at least thirty (30) days prior written notice has been given the Owner and Architect, which may be reduced to at least ten (10) days for non-payment of premium only.

- a. Provide copies of policies renewed, altered and/or replaced during the Work of this project, to the Owner within 10-days of their effective date(s), with copy sent to the Architect.

11.3 PROPERTY INSURANCE:

11.3.1 The Contractor shall provide an All Risk (“open perils”) Builder's Risk Policy with a replacement cost valuation, to cover the interests of all contractor's and sub-contractors of any tier. The contractor and subcontractors of any tier shall be responsible for all risks of physical loss to the work not otherwise covered, including in part, portions of the work stored off the site and in transit between off site storage and site.

11.3.2 The total amount of the insurance shall be the amount of the contract.

11.3.3 The policy or policies shall be endorsed to waive all rights of subrogation among, between, and to each insured under the policy.

11.3.4 The “Owner, Architect, and their Consultants” shall be additionally named primary insureds under the policy or policies. Refer also to Division 1 Section “Special Conditions”, for additional information and requirements.

11.3.5 Any deductibles will be apportioned to the named insureds (but excluding those named in 11.3.4) as their interests may appear, based upon claim payments.

11.3.6 Any claims coming under the terms and conditions of the policies shall be immediately reported by written notice to the Architect, with a copy to the Owner:

Goodwyn, Mills & Cawood, Inc.
117 Jefferson St N
Huntsville, AL 35801
Phone: (205) 879-4462

11.4 PERFORMANCE AND PAYMENT BOND:

11.4.1 The Contractor and subcontractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor’s usual source, and the cost thereof shall be included in the Bid and Contract Sum. The amount of each bond shall be equal to 100-percent (100%) of the Contract Sum.

11.4.1.1 The Contractor shall deliver the required bonds to the construction manager attached to each copy of the Contract which the Contractor is presented to execute for the Work of the Project.

11.4.1.2 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. ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK:

- a. Refer to Subparagraph 12.2.2, and add the following new Subparagraphs:

“12.2.2.1.1 For the purposes of this paragraph, “reasonable time” shall be defined as within ten (10) consecutive calendar days from and after receipt of notice from the Owner and/or Architect.”

“12.2.2.4 Upon request by the Owner, and prior to the expiration of the expiration of one year from the date of Substantial Completion, the Architect will conduct and the Contractor shall attend a meeting with the Owner to review the facility operations and performance.”

12. ARTICLE 15 - CLAIMS AND DISPUTES

- a. Refer to Subparagraph 15.1.5, and add the following new Subparagraphs:

“15.1.5.1 Claims for increase in the Contract Time shall set forth in detail circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work, and the number of normal working days’ increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require, including where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

15.1.5.2 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

15.1.5.3 Refer to Division 1 Section “Special Conditions” and other applicable portions of the Bid and Contract Documents for additional information, requirements, reporting requirements, limitations and exclusions relating to claims for additional time.”

END OF SUPPLEMENTARY CONDITIONS



Special Provisions of the Contract Documents:

Add the following:

Goodwyn Mills Cawood

2400 5th Avenue South
Suite 200
Birmingham, AL 35233

T (205) 879-4462

www.gmcnetwork.com

Under no circumstance will GMC provide hard copy sets of drawings, project manuals, or other contract documents. Upon request from bidders, GMC will provide electronic (PDF) sets of drawings and project manuals prior to award of contract. Upon award of contract, the General Contractor may request digital sheet files using the Electronic File and Transfer Agreement Form and its appropriate procedures and fees.



Electronic File Conversion and Transfer Agreement

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

Goodwyn Mills Cawood

2400 5th Avenue South
Suite 200
Birmingham, AL 35233

T (205) 879-4462

www.gmcnetwork.com

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

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

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

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

GOODWYN MILLS CAWOOD, LLC.

PROJECT

Project Name:

Project No.:

Document Issue Date:

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

Consultants:

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



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

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

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

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

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

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

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

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

APPLICATION AND CERTIFICATE FOR PAYMENT FORM

- 1.1** Application for Payment shall be executed on AIA Document G702 Contractor's Application for Payment, along with AIA Document G703 Continuation Sheet. A draft copy is attached for reference. Copies of G702 and G703 are available for viewing in the office of the Architect, and may be purchased from an AIA documents vendor by the Contractor.

END OF APPLICATION AND CERTIFICATE FOR PAYMENT FORM

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO:	Distribution to:
FROM	VIA	PERIOD TO:	OWNER:
CONTRACTOR:	ARCHITECT:	CONTRACT FOR:	ARCHITECT:
		CONTRACT DATE:	CONTRACTOR:
		PROJECT NOS:	FIELD:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract Continuation Sheet, AIA Document G703, is attached.

- 1. ORIGINAL CONTRACT SUM..... \$0.00
- 2. NET CHANGE BY CHANGE ORDERS..... \$0.00
- 3. CONTRACT SUM TO DATE (Line 1 ± 2) \$0.00
- 4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)..... \$0.00
- 5. RETAINAGE:

a. 0 % of Completed Work
(Column D + E on G703) = \$0.00

b. 0 % of Stored Material
(Column F on G703) = \$0.00

Total Retainage (Lines 5a + 5b or Total in Column I of G703)..... \$0.00

- 6. TOTAL EARNED LESS RETAINAGE..... \$0.00
(Line 4 Less Line 5 Total)
- 7. LESS PREVIOUS CERTIFICATES FOR PAYMENT..... \$0.00
(Line 6 from prior Certificate)
- 8. CURRENT PAYMENT DUE..... \$0.00
- 9. BALANCE TO FINISH, INCLUDING RETAINAGE
(Line 3 less Line 6) \$0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$0.00	\$0.00
Total approved this Month	\$0.00	\$0.00
TOTALS	\$0.00	\$0.00
NET CHANGES by Change Order	\$0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR: _____

By: _____ Date: _____

State of: _____

County of: _____

Subscribed and sworn to before _____ day of _____

me this _____

Notary Public: _____

My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED..... \$0.00
(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT: _____

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

AIA® Document G703™ - 1992

Continuation Sheet

AIA Document G702™-1992, Application and Certification for Payment, or G736™-2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.

In tabulations below, amounts are in US dollars.

Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:

APPLICATION DATE:

PERIOD TO:

ARCHITECT'S PROJECT NO:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		E THIS PERIOD	F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	H BALANCE TO FINISH (C - G)	I RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD						
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
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		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
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		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
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		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00	

INVENTORY OF STORED MATERIALS

Project: ASHVILLE FIRE STATION NO. 2
ASHVILLE, AL

For Estimate No. _____

For Period Ending _____

Contractor:

GM&C Project No. AHUN25003

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

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

CHANGE ORDER FORM

- 1.1** Changes to the Contract shall be made using AIA Document G701 Change Order. A draft copy is attached for reference. Copies of G701 are available for viewing in the office of the Architect, and may be purchased from an AIA documents vendor by the Contractor.

END OF CHANGE ORDER FORM

DRAFT AIA[®] Document G701[™] - 2017

Change Order

PROJECT: *(Name and address)*

CONTRACT INFORMATION:

CHANGE ORDER INFORMATION:

Contract For:

Change Order Number:

Date:

Date:

OWNER: *(Name and address)*

ARCHITECT: *(Name and address)*

CONTRACTOR: *(Name and address)*

THE CONTRACT IS CHANGED AS FOLLOWS:

(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)

The original Contract Sum was

\$ 0.00

The net change by previously authorized Change Orders

\$ 0.00

The Contract Sum prior to this Change Order was

\$ 0.00

The Contract Sum will be increased by this Change Order in the amount of

\$ 0.00

The new Contract Sum including this Change Order will be

\$ 0.00

The Contract Time will be increased by Zero (0) days.

The new date of Substantial Completion will be

NOTE: This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

ARCHITECT *(Firm name)*

CONTRACTOR *(Firm name)*

OWNER *(Firm name)*

SIGNATURE

SIGNATURE

SIGNATURE

PRINTED NAME AND TITLE

PRINTED NAME AND TITLE

PRINTED NAME AND TITLE

DATE

DATE

DATE

CERTIFICATE OF SUBSTANTIAL COMPLETION FORM

- 1.1** Certificate of Substantial Completion shall be executed using AIA Document G704 Certificate of Substantial Completion. A draft copy is attached for reference. Copies of G704 are available for viewing in the office of the Architect, and may be purchased from an AIA documents vendor by the Contractor.

END OF CERTIFICATE OF SUBSTANTIAL COMPLETION FORM

DRAFT AIA[®] Document G704[™] - 2017

Certificate of Substantial Completion

PROJECT: *(name and address)*

CONTRACT INFORMATION:

Contract For:

Date:

CERTIFICATE INFORMATION:

Certificate Number:

Date:

OWNER: *(name and address)*

ARCHITECT: *(name and address)*

CONTRACTOR: *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.

(Identify the Work, or portion thereof, that is substantially complete.)

ARCHITECT *(Firm Name)*

SIGNATURE

PRINTED NAME AND TITLE

DATE OF SUBSTANTIAL COMPLETION

WARRANTIES

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:

(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first.

The Contractor will complete or correct the Work on the list of items attached hereto within () days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR *(Firm Name)*

SIGNATURE

PRINTED NAME AND TITLE

DATE

OWNER *(Firm Name)*

SIGNATURE

PRINTED NAME AND TITLE

DATE

**SECTION 003100
AVAILABLE PROJECT INFORMATION**

PART 1 GENERAL

1.01 EXISTING CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
 - 1. Site and Utility Survey: The site survey of existing conditions of the site is included in the landscapedrawings.
 - 2. Geotechnical Report: The Geotechnical Report is included in these Specifications following this Section.

1.02 PERMITS

- A. The General Contractor is responsible for obtaining and paying for all permits required by the Contract Documents and by law associated with the project, including but not limited to Permit Fees, Plan Review Fees, Inspection Fees, and administrative Fees levied by the AHJ or other government agencies with authority over the project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

3.01 OBTAINMENT OF PERMITS

- A. Contractor to obtain the following required permits, at no cost to Owner:
 - 1. Building Permit for all trades.
- B. Building Permit Procedures: Where Building Permit(s) are required by law, the General Contractor shall:
 - 1. Complete and file permit application(s) with appropriate agency.
 - a. Submit application within five days of the Notice to Proceed.
 - 2. Pay required fees.
 - 3. Advise Architect if submission of modified documents is necessary to have the authorities having jurisdiction complete the plan review and approval process. Submit modified documents expeditiously.
 - 4. Do not commence execution of any item of work for which a permit has not been obtained.

END OF SECTION

**SECTION 010150
SPECIAL CONDITIONS**

COMPLETION

1.01 TIME FOR COMPLETION OF WORK:

- A. The Contractor may proceed to award sub-contracts, assemble materials, etc., after written "Notice To Proceed" with Work is given by the Owner. The Contractor's official time for construction to start on work shall be the date of the Owner's written "Notice to Proceed" with Work; and completion of the Work shall be within the number of consecutive calendar days or by the date(s) indicated on the Contractor's Proposal Form.
 - 1. Properly supervised work, per requirements, will be permitted on Saturdays and Sundays.
- B. Acceptance of the completed Work of this Contract will be at a single date, and not in phases, unless otherwise indicated.
- C. Nothing in the Contract Documents shall permit or be construed to permit payment to the Contractor for any extended overhead or profit due to completion of the project extending beyond the Contractual completion date. In no event shall the Owner or Architect be liable to the Contractor for damage due to any delay to any portion of the Work of this Contract.
- D. Delays: See Article 8.3, and related articles of AIA General Conditions.

1.02 LIQUIDATED DAMAGES:

- A. Actual damages for delay in completion may be impossible to determine, and the Contractor shall be liable for and the Owner shall deduct as liquidated damages from the final payment due the Contractor, the following, in addition to 6% per annum of the total contract amount:
 - 1. For each calendar day of delay in completion of any part of the work beyond the number of days specified, the sum of \$250.00.
 - 2. In the event that work on this project is incomplete and ongoing after the contractual completion date, beginning at ten (10) additional days thereafter, the Owner will also charge the Contractor, an additional \$250.00 per day, for the Owner's nominal reimbursement to the Architect for continued work on the project, which charges will continue until "Substantial Completion" is accomplished.
- B. The submittal of a Bid and/or Proposal by any Contractor and their Subcontractors shall be construed as, in part, acknowledgement and acceptance of these provisions.
- C. The Work of the Contract shall be Substantially Complete within 450 consecutive days from the Owner's official Notice to Proceed.

1.03 SITE RESTRICTIONS:

- A. The limits of work and known restrictions are indicated on the Site Plan and various portions of the Drawings and the Project Manual.
 - 1. Refer also to Section 01 1000 - "Summary of The Work," for additional information and requirements.

1.04 PRE-BID CONFERENCE:

- A. Refer to "Advertisement for Prequalification and Bids" and "Supplementary Instructions to Bidders," for additional information and requirements.

1.05 PRE-CONSTRUCTION CONFERENCES:

- A. Refer to Section 01 3000 - "Administrative Requirements".

1.06 PRE-ROOFING CONFERENCE:

- A. A pre-roofing conference is required before any roofing materials are installed. This conference shall be conducted by a representative of the Architect and attended by representatives of the Owner, building inspection officials (if required), General Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable) and the Roofing Materials

Manufacturer (if warranty is required of this manufacturer). If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting.

- B. The pre-roofing conference is intended to clarify demolition (for renovation or re-roofing projects) and application requirements for work to be completed before roofing operations can begin. This would include a detailed review of the specifications, roof plans, roof deck information, flashing details and approved shop drawings, submittal data, and samples. If conflict exists between the specifications and the Manufacturer's requirements, this shall be resolved. If this pre-roofing conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all roof deck areas and substantial agreement on all points.
- C. The following are to be accomplished during the conference:
 - 1. Review all Factory Mutual and Underwriters Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise.
 - 2. Establish trade-related job schedules, including the installation of roof-mounted mechanical equipment.
 - 3. Establish roofing schedule and work methods that will prevent roof damage.
 - 4. Require that all roof penetrations and walls be in place prior to installing the roof.
 - 5. Establish those areas on the job site that will be designated as work and storage areas for roofing operations.
 - 6. Establish weather and working temperature conditions to which all parties must agree.
 - 7. Establish acceptable methods of protecting the finished roof if any trades must travel across or work on or above any areas of the finished roof.
- D. The Architect shall prepare a written report indicating actions taken and decisions made at this pre-roofing conference. This report shall be made a part of the project record and copies furnished the General Contractor and the Owner.
- E. Refer to Section 01 3000 - "Administrative Requirements" for additional information and requirements.

1.07 CONTRACTOR ACCESS TO SITE:

- A. The Contractor will have access to the site immediately upon receipt of the Owner's written Notice to Proceed with work. All routes of access to the site and gate locations by the Contractor or their subcontractors, are subject to approval by Owner, Architect, and other authorities having jurisdiction. Check site plan for location of work limits. Refer to Section 01 1000 - "Summary of The Work" and Section 01 5000 - "Temporary Facilities," for additional information and requirements.
- B. The Contractor shall be required to coordinate the Work of the project with the Owner's activities, to the extent that the Work of this Contract has little or no effect on normal operations.

1.08 CONTRACTOR'S PLAN FOR CONSTRUCTION OF PROJECT:

- A. Contractor shall prepare and submit within 7 days from award of contract to the Architect for review and approval a Bar Graph, indicating his proposed plan and sequence of operations to complete each phase of this project, on schedule as required by contract. This Bar Graph is not expected to be a Critical Path graph.
 - 1. Schedule should identify project milestones and expected durations.

1.09 CONTRACTOR JOB MEETINGS:

- A. On-Site Meetings with Architect, and various trades, general contractors and subcontractors, shall be conducted by the Contractor as directed by the Architect for purpose of furthering the progress of the work, solving construction problems, and issuing instructions.
- B. Refer to "Pre-construction Conferences" paragraph above, "General Conditions of the Contract", and Section 01 3000 - "Administrative Requirements" for additional information and requirements.

1.10 STORED MATERIALS:

- A. It is recognized that the size of the site is restrictive and that it may be necessary for the Contractor to store some materials for project at locations on the site, prior to removal or disposal. When such on site storage is necessary, comply with requirements of authorities having jurisdiction, including in part, on site retention of earth, storm water run-off, slopes of debris, earth, etc.
- B. Store items to be incorporated in the Work in stable and secure manner, off of ground, separated by hardwood or treated wood blocking, and under cover or in storage building.
 - 1. Any materials found stored directly on ground or paving, in standing water, etc., will be rejected, immediately removed from site, and replaced with new materials at the Contractor's expense.
 - 2. Distribute materials around framing and the roof in such manner as to prevent any damage to structure, construction, improvements, etc.
- C. Refer to Section 01 6000 - "Product Requirements", for additional information and requirements for any off-site stored materials.

1.11 PROTECTION:

- A. The Contractor shall provide and maintain adequate fencing and barricades, where indicated, and wherever required. Building entrances and exits shall remain unobstructed at all times when buildings are occupied.
- B. The Contractor shall provide suitable protection for all employees, the public, students, children, users of other adjacent facilities, and the occupants of existing buildings at all times during the execution of and until the completion of the Work.
 - 1. Construction equipment shall not come in contact with or swing over existing facilities to remain, public areas, occupied buildings, right-of-ways, etc., which are to remain.
- C. The Contractor shall avoid damage as a result of their operations, to the existing buildings, walks, pavement, curbs, grass, shrubbery, trees, utilities, adjoining property, etc., and shall at his/her own expense, completely repair any damage thereto caused by his operations. All repair work is subject to Architect's approval, and that of its Owner.
- D. Refer to Section 01 5000 - "Temporary Facilities and Controls" for additional information and requirements.

1.12 WORK LIMITS PROTECTION:

- A. The Contractor shall locate all temporary buildings, storage of equipment, materials, etc., within a protected area to protect the public, and others from the construction activities. Type and location of such protection shall be as existing at the site, or if not existing or complete, as proposed and furnished by the Contractor, subject to acceptance of the Architect, Owner, and authorities having jurisdiction.
- B. Refer to Section 01 5000 - "Temporary Facilities and Controls" for additional information and requirements.

1.13 EMPLOYMENT OF AND PAYMENT FOR TESTING SERVICES:

- A. The following information regarding Employment of and Payment for Testing Services under the work of Specifications shall take precedence over any conflicting statements otherwise, which may have remained in the Project Manual after editing:
 - 1. Initial testing required by the Contract Documents for Divisions 2 through 5, and Divisions 31-33 (except not utility systems and soil testtesting) shall be provided by an independent testing agency selected, employed and paid by the Owner.
 - 2. Initial testing required by the Contract Documents for all other testing and Divisions 6 through 26 shall be provided by a testing agency acceptable to the Owner, and selected, employed, and paid by the Contractor from his/her Contract amount.

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3. Any retesting required (due to failure of initial testing to meet the requirements of the Contract Documents) shall be at the Contractor's expense.
 4. Any retesting required (due to questionable materials or construction methods, for verification purposes, and etc.) shall be at the Contractor's expense when the results of such retesting indicate any work or materials do not comply with requirements of the Contract Documents. Otherwise, such retesting will be at Owner's expense.
 5. Any retesting under the above provisions shall be performed by the same Owner accepted testing agency.
 6. Nothing in the Contract Documents shall prevent the Contractor from performing any other or additional Quality Control testing at his/her own expense, to verify compliance with the Bid and Contract Documents.
- B. The Contractor shall be responsible for contacting and directing the accepted testing agency and for any follow-up communications required, for all testing required by the Contract Documents.
 - C. No unsuitable or unsatisfactory existing soils or building materials (other than work in Contract) shall be removed without either the presence of or concurrence of and prior approval of the Architect and the accepted testing agency, so as to assure quality of the Work is maintained, and to verify quantities of any additional work under bid "Unit Prices", for which the Contractor is due payment by the Owner.
 - D. The Contractor shall be responsible for contacting and directions to the accepted testing agency and for any follow-up communications required, for all testing required by the Contract Documents.
 - E. Refer to Section 01 4000 - "Quality Requirements" for additional information and requirements.

1.14 PROHIBITED MATERIALS:

- A. ASBESTOS: All materials, equipment, components, accessories, and etc., installed in the work of this contract, both field installed and bought-out manufactured items from any source shall be 100-percent free of asbestos.
- B. LEAD CONTENT: All water-bearing lines, water dispensing equipment, finish materials, and paint other than exposed exterior roof flashings, shall be 100-percent free of lead.
- C. CALCIUM CHLORIDE: Calcium chloride and/or derivatives or additives thereof shall not be permitted in any concrete, concrete product, grout, masonry and/or mortar.
- D. ENVIRONMENTAL REGULATIONS: All materials, their application, installation, and completion, shall comply with applicable environmental regulations, including in part, erosion, air-borne contaminants, and volatile organic compounds (VOC's).
- E. FORMALDEHYDE: All insulation and other products shall be 100-percent free of formaldehyde.

1.15 PROHIBITED EQUIPMENT:

- A. The elevated and framed floor slabs are not designed to accommodate heavy rolling point loads. Scissor lifts are not permitted on any elevated or framed slab during the construction of the project.

1.16 PROJECT SIGNS:

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

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- B. Provide other pedestrian and vehicular signs as necessary and required, in compliance with requirements of authorities having jurisdiction. Signs shall remain on site for duration of this Contract.
 - C. General Contractor may have a sign on his/her Construction Office and as needed for delivery directions only.
 - D. Subcontractors will not be allowed to post signs.
 - E. Refer to Section 01 5813 - "Project Signs" for additional information and requirements.

1.17 PERSONNEL EXPERIENCE AND SUPERINTENDENTS:

- A. Subcontractors shall have no less than 5-years verifiable experience in their trade and no less than 5-years verifiable experience in their business enterprise contracting for work under this project; The type of work subcontracted for this project shall be the principal business of the Subcontractor.
- B. Superintendents and foremen, or other individual in the lead or supervisory position for any portion of the Work under this Contract shall have no less than 7-years verifiable experience in performing the type of work they are responsible for.
 - 1. The Contractor shall submit resumes of work and project experience for their Superintendent and foremen, as soon as possible and at least within five calendar days of receipt of the Contract to be executed for the work, for review and acceptance by the Owner and Architect.
 - 2. If the Superintendent is replaced on the job after work begins, the same qualifications as above apply. Submit for review and acceptance by the Owner and Architect.

1.18 SUBMITTALS:

- A. Submittal requirements are indicated throughout the Contract Documents, and the following supplements those requirements.
 - 1. Electronic Document Submittal Service will be used for administration of the Contract. See Section 01 3000 - Administrative Requirements.
 - 2. Contractor will be required to make submittals for every item and product so indicated; Also upon request, for any additional or other item or products intended for use or incorporation in the Work.
 - a. The Contractor shall submit to the Architect within 30 days of "Notice to Proceed", a complete listing of all required submittals, warranties, guarantees, close-out documents, and materials requiring extra or "attic" stock delivered to the Owner, for review and acceptance. Include for each item, the anticipated date of Submittal to the Architect. Re-submit until accepted or approved.
 - 3. The Contractor shall review, mark all necessary changes, revisions, and questions; and then stamp, sign, approve, and submit to the Architect, all Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, and shall do so with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner, or of separate contractors.
 - a. The Contractor shall not make submittals to the Architect which they have not reviewed, stamped, signed and approved by the Contractor; or in such case, no action will be taken by the Architect or their Consultants regarding that or those submittals.
 - 4. The Contractor shall submit number of copies for review as indicated in Section 01 3000 - Administrative Requirements.
 - 5. Review time will be limited to two weeks, except for more complex submittals, such as Structural, and Divisions 21-26.
 - 6. Colors will not be selected until most or all submittals required have been received and reviewed. Actual color chip samples shall be required along with standard color selection paperwork. No exceptions.

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7. Submit test reports as required or otherwise requested, in the same quantity as other submittal data.
 8. Contractor shall provide letter from Mechanical Contractor stating the Mechanical Contractor has coordinated all power requirements with the Electrical Contractor. Mechanical submittals will not be reviewed without receipt of this letter.
 9. Contractor shall distribute reviewed submittals to all concerned and appropriate Subcontractors and Suppliers.
 10. Contractor shall maintain 1-set of reviewed and approved submittals at his on-site job office.
- B. Review and/or approval of submittals by the Architect, Owner and/or their Consultants shall not relieve the Contractor of his responsibility to comply with the requirements of the Contract Documents.
1. Any proposed change in the Work shall be submitted separate from any other item during construction, with same documentation as pre-bid requests, or they will not be considered.
 2. No actual or proposed change shall be included in Shop Drawings or other Construction submittals, and none so included will be considered approved under any circumstances.
 3. Shop Drawings are communications between the Contractor and various suppliers, fabricators, and subcontractors. The design professional's role is to review the drawings to answer questions that arise about design intent.
 4. Even if a reviewed Shop Drawing or other Submittal has deviations from the original design and the Contract Documents, it in itself is not a Change Order and it is not, IN ITSELF, an approval of the change. Changes can only be approved by Change Order.
 5. Dimensions, quantities, and coordination remain the Contractor's responsibility.
- C. Refer to Section 01 3000 - "Administrative Requirements" for additional information and requirements.

1.19 SITE MAINTENANCE:

- A. The Owner will require all mud or debris resulting from this construction to be removed from streets, sidewalks, etc., by the Contractor as it appears, one or more times daily.
- B. Trash, debris, etc., must be removed from the site as Contractor's trash cans, waste receptacles, etc., are filled. Same will not be allowed to accumulate or blow around the site, within the buildings, etc.
- C. The Contractor shall be responsible for maintaining existing landscaping and lawns within and below any construction fencing, for the duration of the Work of the Contract, or until any such fencing is removed.
- D. Refer to Sections 01 1000, 01 5000, 01 7000 and other locations in the Bid and Contract Documents for additional information and requirements.

1.20 INSURANCE AND SPECIAL PROVISIONS:

- A. The Contractor and their insurer, by execution of the Contract, shall waive all rights of subrogation against "the Owner, the Architect, and their Consultants", and same shall be indicated on all insurance provided by the Contractor and each Subcontractor.
- B. The Contractor and their insurer, and each Subcontractor, shall name "the Owner, Architect, and their Consultants", as additional named primary insureds on all insurance provided by the Contractor and each Subcontractor, except not for "Workers Compensation and Employers Liability".
- C. Refer to "General Conditions" and other portions of the Bid and Contract Documents, for additional information and insurance requirements. Note that Builder's Risk insurance is required, as described in "General Conditions", as modified by "Supplementary Conditions".
 1. Extent of coverage required and/or any approval or acceptance of the insurance carried shall not act to modify the liability of the Contractor, nor to imply that the limits, features

and/or coverages described are adequate to protect the interests or exposures of the Contractor.

- D. The Contractor shall “hold harmless” and indemnify the Owner, Architect, and their Consultants from any claim or legal action resulting from any circumstances related to the Work of this project, including in part, payment of any legal or other expenses, fines, judgments, etc.
- E. Insurance policies required by the Contract Documents shall not be canceled, altered, or changed, without first having given thirty (30) days written notice to the Owner, with a copy sent to the Architect, except ten(10) days written notice for non-payment of premium.
 - 1. Copies of all policies, endorsements, and insurance certificates, including new, renewed, altered, and/or changed during this Contract shall be delivered to the Owner within ten (10) days of effective date(s), with a copy sent to the Architect, by the Contractor.
- F. Refer to General Conditions of the Contract for additional information and requirements regarding minimum insurance and indemnity requirements.
- G. Special Provision: Nothing in this or other paragraphs of the Contract Documents shall create or give to third parties any claim or right of action beyond such as may legally exist irrespective of the Contract.

1.21 ACCESSIBILITY OF ALL COMPLETED WORK:

- A. All products and installations of the Work of this Contract, shall be as designed by the fabricator, manufacturer, etc., and installed by the Contractor, Subcontractors, etc., so as to provide full accessibility to people with disabilities, unless specifically indicated otherwise. This shall include in part, the following:
 - 1. Mounting heights of all electrical devices, switches, etc., all designated plumbing fixtures, and their operation, in all areas except mechanical and electrical rooms, and service areas which are not accessible at any time to the public or Owner’s administrative (not service or maintenance) personnel.
 - 2. Signage.
 - 3. Door operation and hardware.
 - 4. Slip resistance of all completed flooring and walkway surfaces both interior and exterior.
- B. Comply with the more stringent requirements of at least the following, either the latest edition or latest adopted edition of the locality, and all revisions and amendments thereto:
 - 1. American National Standards Institute (ANSI), ANSI A 117.1.
 - 2. D.O.J. ADA Standards for Accessible Design.
 - 3. International Building Code, as applicable at the project locale.

1.22 CONTRACTOR PROGRAMS AND CONDUCT OF PERSONNEL:

- A. The Contractor shall implement programs and make literature available to all construction and administration personnel to encourage making this project a safe place to work, including in part the following requirements: A project site free of any substance abuse, which does not allow any consumption of alcohol, and which does not allow any work to be performed while under the influence of any debilitating substance.
 - 1. The Contractor and every Subcontractor shall have as part of their personnel, safety, substance abuse prevention, and/or quality programs, mandatory drug testing at pre-employment, post-accident, and at random during employees’ tenure with their firms. Each such entity shall be prepared to provide non-confidential verification to the Owner that such testing is consistently on-going, upon Owner’s request for same.
- B. Programs shall be as acceptable to or recommended by one or more of the following:
 - 1. Contractor’s Underwriter for Worker’s Compensation or liability insurance.
 - 2. OSHA.
 - 3. Associated General Contractors.
 - 4. U.S. Department of Defense, Corps of Engineers, or Veterans Administration.

- C. Conduct of all personnel employed for the Work of this project shall be held to a high standard and shall not be offensive to others on or around the site, including in part, pedestrians, the public, the Owner, Owner's Consultants, etc.
 - 1. The Contractor and their employees shall limit any discussion of the Work of this project to the Owner's representative named in the front of this Project Manual, inspecting authorities with jurisdiction, and the Architect; In no instance shall this project be discussed with others, except as may otherwise be indicated herein.
 - 2. The Contractor's personnel and Subcontractors shall not enter the Owner's building, nor use the Owner's telephones (except in emergencies), or the Owner's restrooms.
- D. The Contractor shall immediately dismiss and escort off of the project site, any personnel who are obviously under the influence of alcohol or other debilitating substance, and any personnel exhibiting offensive behavior as described above or by law or by local statute or regulations of authorities having jurisdiction.

1.23 WORK BY OTHERS:

- A. The following items of work are to be provided by others, and are Not in Contract (N.I.C.). The Contractor will be required to coordinate with the Owner as necessary to accommodate provisions for these items.
 - 1. Movable furniture, furnishings, office equipment, library equipment, and movable library shelving unless otherwise indicated.
 - 2. Listed Equipment, residential appliances, and items of Alternate work not accepted at this time, and/or indicated "Not In Contract", "N.I.C.", "Future", and/or similar indication.
 - a. Unless otherwise indicated, coordination, locating, and providing rough-ins for all power, water supply, gas, drains, drain lines, condensate drain outlet, and other utilities required for such equipment, casework, etc., and preparation required for the addition of future finishes (same as level of finish required for the finishes included in Bid, just prior to finishes being added), shall be included in Base Bid;
- B. Refer to Section 01 1000 - "Summary of The Work" for additional information and requirements.

1.24 INSPECTIONS:

- A. See Section 01 3000 - Administrative Requirements for information on Scheduling of Inspections, and Minimum Requirements for Required Inspections.

1.25 USER FEES:

- A. The Contractor is hereby advised that, if applicable, any administrative fees in the fort of a Permit Fee shall be paid by the Contractor.
 - 1. It is the Contractor's responsibility to obtain all applicable permits associated with the work of the contract.

END OF SECTION

**SECTION 010150
SPECIAL CONDITIONS**

COMPLETION

1.01 TIME FOR COMPLETION OF WORK:

- A. The Contractor may proceed to award sub-contracts, assemble materials, etc., after written "Notice To Proceed" with Work is given by the Owner. The Contractor's official time for construction to start on work shall be the date of the Owner's written "Notice to Proceed" with Work; and completion of the Work shall be within the number of consecutive calendar days or by the date(s) indicated on the Contractor's Proposal Form.
 - 1. Properly supervised work, per requirements, will be permitted on Saturdays and Sundays.
- B. Acceptance of the completed Work of this Contract will be at a single date, and not in phases, unless otherwise indicated.
- C. Nothing in the Contract Documents shall permit or be construed to permit payment to the Contractor for any extended overhead or profit due to completion of the project extending beyond the Contractual completion date. In no event shall the Owner or Architect be liable to the Contractor for damage due to any delay to any portion of the Work of this Contract.
- D. Delays: See Article 8.3, and related articles of AIA General Conditions.

1.02 LIQUIDATED DAMAGES:

- A. Actual damages for delay in completion may be impossible to determine, and the Contractor shall be liable for and the Owner shall deduct as liquidated damages from the final payment due the Contractor, the following, in addition to 6% per annum of the total contract amount:
 - 1. For each calendar day of delay in completion of any part of the work beyond the number of days specified, the sum of \$250.00.
 - 2. In the event that work on this project is incomplete and ongoing after the contractual completion date, beginning at ten (10) additional days thereafter, the Owner will also charge the Contractor, an additional \$250.00 per day, for the Owner's nominal reimbursement to the Architect for continued work on the project, which charges will continue until "Substantial Completion" is accomplished.
- B. The submittal of a Bid and/or Proposal by any Contractor and their Subcontractors shall be construed as, in part, acknowledgement and acceptance of these provisions.
- C. The Work of the Contract shall be Substantially Complete within 450 consecutive days from the Owner's official Notice to Proceed.

1.03 SITE RESTRICTIONS:

- A. The limits of work and known restrictions are indicated on the Site Plan and various portions of the Drawings and the Project Manual.
 - 1. Refer also to Section 01 1000 - "Summary of The Work," for additional information and requirements.

1.04 PRE-BID CONFERENCE:

- A. Refer to "Advertisement for Prequalification and Bids" and "Supplementary Instructions to Bidders," for additional information and requirements.

1.05 PRE-CONSTRUCTION CONFERENCES:

- A. Refer to Section 01 3000 - "Administrative Requirements".

1.06 PRE-ROOFING CONFERENCE:

- A. A pre-roofing conference is required before any roofing materials are installed. This conference shall be conducted by a representative of the Architect and attended by representatives of the

Owner, building inspection officials (if required), General Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable) and the Roofing Materials Manufacturer (if warranty is required of this manufacturer). If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting.

- B. The pre-roofing conference is intended to clarify demolition (for renovation or re-roofing projects) and application requirements for work to be completed before roofing operations can begin. This would include a detailed review of the specifications, roof plans, roof deck information, flashing details and approved shop drawings, submittal data, and samples. If conflict exists between the specifications and the Manufacturer's requirements, this shall be resolved. If this pre-roofing conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all roof deck areas and substantial agreement on all points.
- C. The following are to be accomplished during the conference:
 - 1. Review all Factory Mutual and Underwriters Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise.
 - 2. Establish trade-related job schedules, including the installation of roof-mounted mechanical equipment.
 - 3. Establish roofing schedule and work methods that will prevent roof damage.
 - 4. Require that all roof penetrations and walls be in place prior to installing the roof.
 - 5. Establish those areas on the job site that will be designated as work and storage areas for roofing operations.
 - 6. Establish weather and working temperature conditions to which all parties must agree.
 - 7. Establish acceptable methods of protecting the finished roof if any trades must travel across or work on or above any areas of the finished roof.
- D. The Architect shall prepare a written report indicating actions taken and decisions made at this pre-roofing conference. This report shall be made a part of the project record and copies furnished the General Contractor and the Owner.
- E. Refer to Section 01 3000 - "Administrative Requirements" for additional information and requirements.

1.07 CONTRACTOR ACCESS TO SITE:

- A. The Contractor will have access to the site immediately upon receipt of the Owner's written Notice to Proceed with work. All routes of access to the site and gate locations by the Contractor or their subcontractors, are subject to approval by Owner, Architect, and other authorities having jurisdiction. Check site plan for location of work limits. Refer to Section 01 1000 - "Summary of The Work" and Section 01 5000 - "Temporary Facilities," for additional information and requirements.
- B. The Contractor shall be required to coordinate the Work of the project with the Owner's activities, to the extent that the Work of this Contract has little or no effect on normal operations.

1.08 CONTRACTOR'S PLAN FOR CONSTRUCTION OF PROJECT:

- A. Contractor shall prepare and submit within 7 days from award of contract to the Architect for review and approval a Bar Graph, indicating his proposed plan and sequence of operations to complete each phase of this project, on schedule as required by contract. This Bar Graph is not expected to be a Critical Path graph.
 - 1. Schedule should identify project milestones and expected durations.

1.09 CONTRACTOR JOB MEETINGS:

- A. On-Site Meetings with Architect , and various trades, general contractors and subcontractors, shall be conducted by the Contractor as directed by the Architect for purpose of furthering the progress of the work, solving construction problems, and issuing instructions.
- B. Refer to "Pre-construction Conferences" paragraph above, "General Conditions of the Contract", and Section 01 3000 - "Administrative Requirements" for additional information and requirements.

1.10 STORED MATERIALS:

- A. It is recognized that the size of the site is restrictive and that it may be necessary for the Contractor to store some materials for project at locations on the site, prior to removal or disposal. When such on site storage is necessary, comply with requirements of authorities having jurisdiction, including in part, on site retention of earth, storm water run-off, slopes of debris, earth, etc.
- B. Store items to be incorporated in the Work in stable and secure manner, off of ground, separated by hardwood or treated wood blocking, and under cover or in storage building.
 - 1. Any materials found stored directly on ground or paving, in standing water, etc., will be rejected, immediately removed from site, and replaced with new materials at the Contractor's expense.
 - 2. Distribute materials around framing and the roof in such manner as to prevent any damage to structure, construction, improvements, etc.
- C. Refer to Section 01 6000 - "Product Requirements", for additional information and requirements for any off-site stored materials.

1.11 PROTECTION:

- A. The Contractor shall provide and maintain adequate fencing and barricades, where indicated, and wherever required. Building entrances and exits shall remain unobstructed at all times when buildings are occupied.
- B. The Contractor shall provide suitable protection for all employees, the public, students, children, users of other adjacent facilities, and the occupants of existing buildings at all times during the execution of and until the completion of the Work.
 - 1. Construction equipment shall not come in contact with or swing over existing facilities to remain, public areas, occupied buildings, right-of-ways, etc., which are to remain.
- C. The Contractor shall avoid damage as a result of their operations, to the existing buildings, walks, pavement, curbs, grass, shrubbery, trees, utilities, adjoining property, etc., and shall at his/her own expense, completely repair any damage thereto caused by his operations. All repair work is subject to Architect's approval, and that of its Owner.
- D. Refer to Section 01 5000 - "Temporary Facilities and Controls" for additional information and requirements.

1.12 WORK LIMITS PROTECTION:

- A. The Contractor shall locate all temporary buildings, storage of equipment, materials, etc., within a protected area to protect the public, and others from the construction activities. Type and location of such protection shall be as existing at the site, or if not existing or complete, as proposed and furnished by the Contractor, subject to acceptance of the Architect, Owner, and authorities having jurisdiction.
- B. Refer to Section 01 5000 - "Temporary Facilities and Controls" for additional information and requirements.

1.13 EMPLOYMENT OF AND PAYMENT FOR TESTING SERVICES:

- A. The following information regarding Employment of and Payment for Testing Services under the work of Specifications shall take precedence over any conflicting statements otherwise, which may have remained in the Project Manual after editing:
 - 1. Initial testing required by the Contract Documents for Divisions 2 through 5, and Divisions 31-33 (except not utility systems and soil testtesting) shall be provided by an independent testing agency selected, employed and paid by the Owner.
 - 2. Initial testing required by the Contract Documents for all other testing and Divisions 6 through 26 shall be provided by a testing agency acceptable to the Owner, and selected, employed, and paid by the Contractor from his/her Contract amount.
 - 3. Any retesting required (due to failure of initial testing to meet the requirements of the Contract Documents) shall be at the Contractor's expense.
 - 4. Any retesting required (due to questionable materials or construction methods, for verification purposes, and etc.) shall be at the Contractor's expense when the results of such retesting indicate any work or materials do not comply with requirements of the Contract Documents. Otherwise, such retesting will be at Owner's expense.
 - 5. Any retesting under the above provisions shall be performed by the same Owner accepted testing agency.
 - 6. Nothing in the Contract Documents shall prevent the Contractor from performing any other or additional Quality Control testing at his/her own expense, to verify compliance with the Bid and Contract Documents.
- B. The Contractor shall be responsible for contacting and directing the accepted testing agency and for any follow-up communications required, for all testing required by the Contract Documents.
- C. No unsuitable or unsatisfactory existing soils or building materials (other than work in Contract) shall be removed without either the presence of or concurrence of and prior approval of the Architect and the accepted testing agency, so as to assure quality of the Work is maintained, and to verify quantities of any additional work under bid "Unit Prices", for which the Contractor is due payment by the Owner.
- D. The Contractor shall be responsible for contacting and directions to the accepted testing agency and for any follow-up communications required, for all testing required by the Contract Documents.
- E. Refer to Section 01 4000 - "Quality Requirements" for additional information and requirements.

1.14 PROHIBITED MATERIALS:

- A. **ASBESTOS:** All materials, equipment, components, accessories, and etc., installed in the work of this contract, both field installed and bought-out manufactured items from any source shall be 100-percent free of asbestos.
- B. **LEAD CONTENT:** All water-bearing lines, water dispensing equipment, finish materials, and paint other than exposed exterior roof flashings, shall be 100-percent free of lead.
- C. **CALCIUM CHLORIDE:** Calcium chloride and/or derivatives or additives thereof shall not be permitted in any concrete, concrete product, grout, masonry and/or mortar.
- D. **ENVIRONMENTAL REGULATIONS:** All materials, their application, installation, and completion, shall comply with applicable environmental regulations, including in part, erosion, air-borne contaminants, and volatile organic compounds (VOC's).
- E. **FORMALDEHYDE:** All insulation and other products shall be 100-percent free of formaldehyde.

1.15 PROHIBITED EQUIPMENT:

- A. The elevated and framed floor slabs are not designed to accommodate heavy rolling point loads. Scissor lifts are not permitted on any elevated or framed slab during the construction of the project.

1.16 PROJECT SIGNS:

- A. Provide, securely install and maintain prefinished metal signs on each side of each gate leaf and at 50'-0" o.c. maximum on street/public side of all construction fencing provided (if any).
 - 1. Copy: "NO TRESPASSING
 - 2. DANGER
 - 3. CONSTRUCTION AREA"
 - 4. Size: Approximately 1'-6" wide x 1'-0" high.
- B. Provide other pedestrian and vehicular signs as necessary and required, in compliance with requirements of authorities having jurisdiction. Signs shall remain on site for duration of this Contract.
- C. General Contractor may have a sign on his/her Construction Office and as needed for delivery directions only.
- D. Subcontractors will not be allowed to post signs.
- E. Refer to Section 01 5813 - "Project Signs" for additional information and requirements.

1.17 PERSONNEL EXPERIENCE AND SUPERINTENDENTS:

- A. Subcontractors shall have no less than 5-years verifiable experience in their trade and no less than 5-years verifiable experience in their business enterprise contracting for work under this project; The type of work subcontracted for this project shall be the principal business of the Subcontractor.
- B. Superintendents and foremen, or other individual in the lead or supervisory position for any portion of the Work under this Contract shall have no less than 7-years verifiable experience in performing the type of work they are responsible for.
 - 1. The Contractor shall submit resumes of work and project experience for their Superintendent and foremen, as soon as possible and at least within five calendar days of receipt of the Contract to be executed for the work, for review and acceptance by the Owner and Architect.
 - 2. If the Superintendent is replaced on the job after work begins, the same qualifications as above apply. Submit for review and acceptance by the Owner and Architect.

1.18 SUBMITTALS:

- A. Submittal requirements are indicated throughout the Contract Documents, and the following supplements those requirements.
 - 1. Electronic Document Submittal Service will be used for administration of the Contract. See Section 01 3000 - Administrative Requirements.
 - 2. Contractor will be required to make submittals for every item and product so indicated; Also upon request, for any additional or other item or products intended for use or incorporation in the Work.
 - a. The Contractor shall submit to the Architect within 30 days of "Notice to Proceed", a complete listing of all required submittals, warranties, guarantees, close-out documents, and materials requiring extra or "attic" stock delivered to the Owner, for review and acceptance. Include for each item, the anticipated date of Submittal to the Architect. Re-submit until accepted or approved.
 - 3. The Contractor shall review, mark all necessary changes, revisions, and questions; and then stamp, sign, approve, and submit to the Architect, all Shop Drawings, Product Data,

Samples, and similar submittals required by the Contract Documents, and shall do so with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner, or of separate contractors.

- a. The Contractor shall not make submittals to the Architect which they have not reviewed, stamped, signed and approved by the Contractor; or in such case, no action will be taken by the Architect or their Consultants regarding that or those submittals.
 4. The Contractor shall submit number of copies for review as indicated in Section 01 3000 - Administrative Requirements.
 5. Review time will be limited to two weeks, except for more complex submittals, such as Structural, and Divisions 21-26.
 6. Colors will not be selected until most or all submittals required have been received and reviewed. Actual color chip samples shall be required along with standard color selection paperwork. No exceptions.
 7. Submit test reports as required or otherwise requested, in the same quantity as other submittal data.
 8. Contractor shall provide letter from Mechanical Contractor stating the Mechanical Contractor has coordinated all power requirements with the Electrical Contractor. Mechanical submittals will not be reviewed without receipt of this letter.
 9. Contractor shall distribute reviewed submittals to all concerned and appropriate Subcontractors and Suppliers.
 10. Contractor shall maintain 1-set of reviewed and approved submittals at his on-site job office.
- B. Review and/or approval of submittals by the Architect, Owner and/or their Consultants shall not relieve the Contractor of his responsibility to comply with the requirements of the Contract Documents.
1. Any proposed change in the Work shall be submitted separate from any other item during construction, with same documentation as pre-bid requests, or they will not be considered.
 2. No actual or proposed change shall be included in Shop Drawings or other Construction submittals, and none so included will be considered approved under any circumstances.
 3. Shop Drawings are communications between the Contractor and various suppliers, fabricators, and subcontractors. The design professional's role is to review the drawings to answer questions that arise about design intent.
 4. Even if a reviewed Shop Drawing or other Submittal has deviations from the original design and the Contract Documents, it in itself is not a Change Order and it is not, IN ITSELF, an approval of the change. Changes can only be approved by Change Order.
 5. Dimensions, quantities, and coordination remain the Contractor's responsibility.
- C. Refer to Section 01 3000 - "Administrative Requirements" for additional information and requirements.

1.19 SITE MAINTENANCE:

- A. The Owner will require all mud or debris resulting from this construction to be removed from streets, sidewalks, etc., by the Contractor as it appears, one or more times daily.
- B. Trash, debris, etc., must be removed from the site as Contractor's trash cans, waste receptacles, etc., are filled. Same will not be allowed to accumulate or blow around the site, within the buildings, etc.
- C. The Contractor shall be responsible for maintaining existing landscaping and lawns within and below any construction fencing, for the duration of the Work of the Contract, or until any such fencing is removed.

- D. Refer to Sections 01 1000, 01 5000, 01 7000 and other locations in the Bid and Contract Documents for additional information and requirements.

1.20 INSURANCE AND SPECIAL PROVISIONS:

- A. The Contractor and their insurer, by execution of the Contract, shall waive all rights of subrogation against "the Owner, the Architect, and their Consultants", and same shall be indicated on all insurance provided by the Contractor and each Subcontractor.
- B. The Contractor and their insurer, and each Subcontractor, shall name "the Owner, Architect, and their Consultants", as additional named primary insureds on all insurance provided by the Contractor and each Subcontractor, except not for "Workers Compensation and Employers Liability".
- C. Refer to "General Conditions" and other portions of the Bid and Contract Documents, for additional information and insurance requirements. Note that Builder's Risk insurance is required, as described in "General Conditions", as modified by "Supplementary Conditions".
1. Extent of coverage required and/or any approval or acceptance of the insurance carried shall not act to modify the liability of the Contractor, nor to imply that the limits, features and/or coverages described are adequate to protect the interests or exposures of the Contractor.
- D. The Contractor shall "hold harmless" and indemnify the Owner, Architect, and their Consultants from any claim or legal action resulting from any circumstances related to the Work of this project, including in part, payment of any legal or other expenses, fines, judgments, etc.
- E. Insurance policies required by the Contract Documents shall not be canceled, altered, or changed, without first having given thirty (30) days written notice to the Owner, with a copy sent to the Architect, except ten(10) days written notice for non-payment of premium.
1. Copies of all policies, endorsements, and insurance certificates, including new, renewed, altered, and/or changed during this Contract shall be delivered to the Owner within ten (10) days of effective date(s), with a copy sent to the Architect, by the Contractor.
- F. Refer to General Conditions of the Contract for additional information and requirements regarding minimum insurance and indemnity requirements.
- G. Special Provision: Nothing in this or other paragraphs of the Contract Documents shall create or give to third parties any claim or right of action beyond such as may legally exist irrespective of the Contract.

1.21 ACCESSIBILITY OF ALL COMPLETED WORK:

- A. All products and installations of the Work of this Contract, shall be as designed by the fabricator, manufacturer, etc., and installed by the Contractor, Subcontractors, etc., so as to provide full accessibility to people with disabilities, unless specifically indicated otherwise. This shall include in part, the following:
1. Mounting heights of all electrical devices, switches, etc., all designated plumbing fixtures, and their operation, in all areas except mechanical and electrical rooms, and service areas which are not accessible at any time to the public or Owner's administrative (not service or maintenance) personnel.
 2. Signage.
 3. Door operation and hardware.
 4. Slip resistance of all completed flooring and walkway surfaces both interior and exterior.
- B. Comply with the more stringent requirements of at least the following, either the latest edition or latest adopted edition of the locality, and all revisions and amendments thereto:
1. American National Standards Institute (ANSI), ANSI A 117.1.
 2. D.O.J. ADA Standards for Accessible Design.

3. International Building Code, as applicable at the project locale.

1.22 CONTRACTOR PROGRAMS AND CONDUCT OF PERSONNEL:

- A. The Contractor shall implement programs and make literature available to all construction and administration personnel to encourage making this project a safe place to work, including in part the following requirements: A project site free of any substance abuse, which does not allow any consumption of alcohol, and which does not allow any work to be performed while under the influence of any debilitating substance.
1. The Contractor and every Subcontractor shall have as part of their personnel, safety, substance abuse prevention, and/or quality programs, mandatory drug testing at pre-employment, post-accident, and at random during employees' tenure with their firms. Each such entity shall be prepared to provide non-confidential verification to the Owner that such testing is consistently on-going, upon Owner's request for same.
- B. Programs shall be as acceptable to or recommended by one or more of the following:
1. Contractor's Underwriter for Worker's Compensation or liability insurance.
 2. OSHA.
 3. Associated General Contractors.
 4. U.S. Department of Defense, Corps of Engineers, or Veterans Administration.
- C. Conduct of all personnel employed for the Work of this project shall be held to a high standard and shall not be offensive to others on or around the site, including in part, pedestrians, the public, the Owner, Owner's Consultants, etc.
1. The Contractor and their employees shall limit any discussion of the Work of this project to the Owner's representative named in the front of this Project Manual, inspecting authorities with jurisdiction, and the Architect; In no instance shall this project be discussed with others, except as may otherwise be indicated herein.
 2. The Contractor's personnel and Subcontractors shall not enter the Owner's building, nor use the Owner's telephones (except in emergencies), or the Owner's restrooms.
- D. The Contractor shall immediately dismiss and escort off of the project site, any personnel who are obviously under the influence of alcohol or other debilitating substance, and any personnel exhibiting offensive behavior as described above or by law or by local statute or regulations of authorities having jurisdiction.

1.23 WORK BY OTHERS:

- A. The following items of work are to be provided by others, and are Not in Contract (N.I.C.). The Contractor will be required to coordinate with the Owner as necessary to accommodate provisions for these items.
1. Movable furniture, furnishings, office equipment, library equipment, and movable library shelving unless otherwise indicated.
 2. Listed Equipment, residential appliances, and items of Alternate work not accepted at this time, and/or indicated "Not In Contract", "N.I.C.", "Future", and/or similar indication.
 - a. Unless otherwise indicated, coordination, locating, and providing rough-ins for all power, water supply, gas, drains, drain lines, condensate drain outlet, and other utilities required for such equipment, casework, etc., and preparation required for the addition of future finishes (same as level of finish required for the finishes included in Bid, just prior to finishes being added), shall be included in Base Bid;
- B. Refer to Section 01 1000 - "Summary of The Work" for additional information and requirements.

1.24 INSPECTIONS:

- A. See Section 01 3000 - Administrative Requirements for information on Scheduling of Inspections, and Minimum Requirements for Required Inspections.

1.25 USER FEES:

- A. The Contractor is hereby advised that, if applicable, any administrative fees in the fort of a Permit Fee shall be paid by the Contractor.
 - 1. It is the Contractor's responsibility to obtain all applicable permits associated with the work of the contract.

END OF SECTION

**SECTION 011000
SUMMARY OF THE WORK**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND GENERAL INFORMATION

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.02 PROJECT/WORK IDENTIFICATION

- A. General: Project name is "Ashville Fire Station No. 2", as shown on the Contract Documents prepared by Goodwyn Mills Cawood, LLC., dated January 7, 2026.
- B. Contract Documents indicate the work of the Contract and related requirements and conditions that have an impact on the project.
- C. Summary by References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions (if any), the Project Manual, Technical Specification Sections, Drawings, Addenda and modifications to the Contract Documents issued subsequent to the initial printing of this Project Manual and the Drawings, and including but not necessarily limited to printed material referenced by any of these. It is recognized that the Work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions, and other forces outside the contract documents.
- D. Abbreviated Written Summary: Briefly and without force and effect upon the contract documents, the Work of the Contract can be summarized as follows:
1. The work includes but is not limited to construction of a new city park that includes concrete walks, recreational areas, and landscape improve

1.03 CONTRACTOR USE OF PREMISES

- A. General: During the entire construction period the Contractor shall have the exclusive use of the premises for construction operations, including full use of the site as shown on the Drawings.
1. Limitations of exclusive use of the site:
 - a. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to applicable rules and regulations affecting the work while engaged in project construction. See site plan for egress and ingress to site, or if not indicated, same shall be as designated by the Owner.
 - b. Keep existing public roads, driveways and entrances serving the premises clear and available at all times. Do not use these areas for parking or storage of materials. Remove dirt, mud, debris, etc., from site, sidewalks, streets, and public right-of-way as it occurs.
 - c. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off site in a fully bonded and insured facility acceptable to the Owner, with all items stored clearly identified as being assigned to this project.
 - d. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running, or the ignition key in place.

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- e. The Owner, and their representatives, the Architect and their Consultants, as well as authorities having jurisdiction will require site accessibility for inspections, observations, and perhaps other purposes, related to the planned new construction. The Contractor shall assist in such accessibility, to at least the point of providing and maintaining reasonably accessible dry paths to work in progress.
 - f. Construction operations shall not effect in any manner, the on-going operations of the Owner, immediately adjacent facilities, adjacent property owners or businesses, or others. Refer to Division 1 Section "Special Conditions" for additional information and requirements regarding coordination with Owner's activities.
 - 1) Construction equipment shall not come in contact with or swing over existing facilities to remain, public areas, occupied buildings, right-of-ways, etc., which are to remain.
 - g. The Contractor and their employees shall limit any discussion of the Work of this project to the Owner's representatives named in the front of this Project Manual, Consultants employed, inspecting authorities with jurisdiction, and the Architect. In no instance shall this project be discussed with others, except as may otherwise be indicated herein.
 - h. Parking on-site, if any, shall be limited to the "staging areas" indicated on the Drawings, or if not indicated, as mutually agreed between the Owner, Architect, and Contractor at the Pre-Construction Conference.
 - i. Smoking or other use of tobacco products shall not be permitted within the Owner's facilities or on roofs.
 - j. The use or presence of alcohol and/or other debilitating substances shall not be permitted on the project site.
 - k. Firearms and/or other weapons shall not be permitted on the project site.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2100
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash allowances.
- B. Contingency allowance.

1.02 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.03 DESCRIPTION OF REQUIREMENTS:

- A. Definitions and Explanations: Certain requirements of the work related to each allowance are shown and specified in contract documents. The allowance has been established in lieu of additional requirements for that work, and further requirements thereof (if any) will be issued by change order.
- B. Types of allowances scheduled herein for the work included the following:
 - 1. Unit cost allowances.
 - 2. Lump sum allowances.
- C. Selection and Purchase:
 - 1. At earliest feasible date after award of Contract, advise Architect/Engineer of scheduled date when final selection and purchase of each product or system described by each allowance must be accomplished in order to avoid delays in performance of the work.
 - 2. As requested by the Architect/Engineer, obtain and submit proposals for the work of each allowance for use in making final selections; include recommendations for selection which are relevant to the proper performance of the work.
 - 3. Purchase products and systems as specified, and as selected (in writing) by the Architect/Engineer.
 - 4. Submit proposals and recommendations, for purchase of products or systems of allowances, in form specified for change orders.
- D. Change Order Data: Include in each change order proposal both the quantities of products being purchased and unit costs, along with total amount of purchases to be made. Where requested, furnish survey-of-requirements data to substantiate quantities. Indicate applicable delivery charges, amounts of applicable trade discounts, and other relevant details as requested by the Architect.
 - 1. Each change order amount for allowances shall be based on the unit price difference between the actual purchase amount and the allowance, multiplied by the final measure or count of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections and similar margins.
 - 2. Include overhead and profit in the Contractor's Allowance.
 - 3. When requested, prepare explanations and documentation to substantiate the quantities, costs, and margins as claimed.
- E. Change Order Mark-Up:
 - 1. Except as otherwise indicated, comply with provisions of General Conditions. For each allowance, Contractor's claims for increased costs (for either purchase amount or Contractor's handling, labor, installation, overhead, and profit), because of a change in

scope or nature of the allowance work as described in contract documents, must be submitted within 60 days of initial change order authorizing work to proceed on that allowance; otherwise, such claims will be rejected.

2. Where it is not economically feasible to return unused material to the manufacturer/supplier for credit, prepare unused material for the Owner's storage, and deliver to the Owner's storage space as directed. Otherwise, disposal of excess material is the Contractor's responsibility.
- F. Time and Allowance Amounts:
1. Nothing in the Bid or Contract Documents shall be so construed or interpreted as to provide a Contract time extension, due to use or non-use of any Allowance amount.
 2. Nothing in the Bid or Contract Documents shall be so construed or interpreted as to allow unused Allowances or any portion thereof, nor any overhead and profit therefor to be retained by or paid to the Contractor.
 - a. Full amount of unused allowances shall be returned to the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF ALLOWANCES:

- A. **Allowance No. 1 - OWNER CONTINGENCY:**
1. Allow a lump sum allowance of \$200,000.00 as an Owner Contingency Allowance.
 2. Include overhead and profit in Base Bid and not part of Allowance.
- B. **Allowance No. 2 - AUDIO VISUAL:**
1. Allow lump sum of \$20,000.00 for the Owners P/A system
 2. Include overhead and profit in Base Bid, and not as part of Allowance.
- C. **Allowance No. 3 - PERMANENT CORES AND KEYS:**
1. Allow a lump sum of \$7,500.00 for purchase of permanent keyed cores and associated keys, as directed by owner. Cores to match owner's existing key system, keyway, to be used in lock cylinder housings supplied under Division 08 Section 08710 –Finish Hardware. Provide each core with one operating key. New key system shall include: 5 master keys per master key group created, 2 permanent control keys and 5 grand master keys and 30 blanks.
 2. Include installation of permanent cores and installation material costs in Base Bid, and not as part of Allowance.
- D. **Allowance No. 4 - IT ALLOWANCE:**
1. Allow a lump sum of \$10,000.00 for Owner's IT scope beyond items shown on the drawings.
 2. Include overhead and profit in Base Bid, and not as part of Allowance.
- E. **Allowance No. 5 – LANDSCAPING & IRRIGATION**
1. Allow a lump sum of \$45,000.00 for code minimum landscaping.
 2. Include overhead and profit in Base Bid, and not as part of Allowance.
- F. **Allowance No. 6 – AID TO CONSTRUCT:**
1. Allow a \$65,000.00 aid to construct for connection of utilities and to move two power poles.
 2. Include overhead and profit in Base Bid, and not as part of Allowance.
- G. **Allowance No. 7 - SECURITY:**
1. Allow a unit cost of \$5,000.00 for the purchase, delivery, and installation of security camera's.
 2. Include overhead and profit in Base Bid, and not as part of Allowance.

- H. **Allowance No. 8 – POWER & DATA:**
1. Allow a unit cost of \$5,000.00 for Owner requested additional power and data drops not included on the bid documents.
 2. Include overhead and profit in Base Bid and not as part of Allowance.
- I. **Allowance No. 9 – EMERGENCY RESPONDER RADIO TEST**
1. Allow for \$50,000.00 for work associated with purchase, delivery, and installation of an emergency responder radio system.
 2. Include overhead and profit in Base Bid and not as part of Allowance.
- J. **Allowance No. 10 – INTERIOR AND EXTERIOR SIGNAGE**
1. Allow for \$15,000.00 for fabrication, delivery, and installation of interior signage and for exterior metal channel cut letters and logo.
 2. Include overhead and profit in Base Bid and not as part of Allowance.
- K. **Allowance No. 11 – MASONRY VENEER**
1. Allow for \$650/1000 for brick veneer.
 2. Allow for \$30/bag for colored mortar (2 colors)
- L. **Allowance No. 12 – EARTH MOVING:**
1. Undercut and backfill with offsite material within the building control area and pavement control area. include 2600 Cubic Yards for site excavation, purchase, delivery, and installation of backfill.
- M. **Allowance No. 13 – CONCRETE FOOTINGS FOR PEMB**
1. Allow for \$15,000 for additional concrete, reinforcing steel, excavation and labor for foundations at pre-engineered metal building.
 2. Include overhead and profit in Base Bid and not as part of allowance.
- N. **Allowance No 14 – MISC. STEEL**
1. Allow for additional one-half (1/2) pre-engineered metal building design in addition to basis of design.
 2. Include associated and delivery is part of base bid.
- N. **Allowance No 15 – METAL CANOPY**
1. Allow for \$20,000 for design, fabrication, delivery, and installation of prefabricated metal canopy in addition to basis of design.
 2. Include associated and delivery is part of base bid.

END OF SECTION

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**SECTION 012200
UNIT PRICES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for unit prices.
1. A unit price is an amount proposed by Bidders and stated on "Attachment A to Proposal Form", as a price per unit of measurement for materials and/or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased, in accordance the General Conditions and/or other provisions of the Bid and Contract Documents.
 2. Unit prices shall include all necessary material, labor, fees, layout, supervision (field and home office), general expenses, insurance, bonds, overhead, profit and applicable taxes, for unit item of work in place.
 3. Refer to other Division 1 Sections and individual Specification Sections for construction activities requiring the establishment of unit prices. Methods of approval, verification, measurement and payment for unit prices are specified in those sections.
- B. Related work specified elsewhere includes:
1. Section 01 0150 - Special Conditions.
 2. Division 3 - Concrete Sections.
 3. Division 7 - Thermal and Moisture Protection Sections.
 4. Division 8 - Openings Sections.
 5. Division 9 - Finishes Sections.
 6. Division 10 - Specialties Sections.
 7. Division 11 - Equipment Section.
 8. Divisions 31-35 - Site Work Divisions.
- C. Schedule:
1. A "Unit Price Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each unit price.
 2. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

1.03 COSTS INCLUDED

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

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 ITEMIZED UNIT PRICE SCHEDULE

- A. Item No. 1 - Mass Earth Excavation:
1. Unit of Measure: Cubic yard (CY) of earth excavated.
- B. Item No. 2 - Trench Earth Excavation:

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1. Unit of Measure: Cubic yard (CY) of earth excavated.
 - C. Item No. 3 - Hand Earth Excavation:
 1. Unit of Measure: Cubic yard (CY) of earth excavated.
 - D. Item No. 4 - Additional Soil:
 1. Item No. 1 - Topsoil:
 2. Unit of Measure: Cubic yard (CY) of topsoil, in place.
 - E. Item No. 5 - Rock, Masonry, or Concrete Excavation in Trenches and Pits:
 1. Unit of Measure: Cubic Yard (CY) of rock, masonry, or concrete excavated.
 - F. Item No. 6 - Sod:
 1. Unit of Measure: Square yard (SY) of sod, in place.
 - G. Item No. 7 - Undercut & Backfill in Building Control Areas:
 1. Unit of Measure: Cubic Yard (CY) of unsuitable material.
 - H. Item No. 8 - Undercut & Backfill in Non-Building Control Areas:
 1. Unit of Measure: Cubic Yard (CY) of unsuitable material.
 - I. Item No. 9 - Crushed Stone.
 1. Description: Provide additional crushed stone, ALDOT 825B or approved equal, as directed by the Owner's Geotechnical Engineer.
 2. Unit of Measure: Ton (TN) of crushed stone in place.
 - J. Item No. 10 - Overhead Utility Relocation:
 1. Description: Relocate overhead utilities, including electrical, phone, and data lines, as required.
 2. Unit of Measure: Linear Foot (LF).
 - K. Item No. 11 - Underground Utility Relocation:
 1. Description: Relocate underground utilities, including sewer, water and electrical lines, as required.
 2. Unit of Measure: Linear Foot (LF).
 - L. Item No. 12 - Concrete Sidewalk.
 1. Description: Install concrete sidewalk not otherwise shown on drawings, in location directed by Architect.
 2. Unit of Measure: Square Foot (SF) of sidewalk installed.
 - M. Item No. 13 - Painting (Wall).
 1. Description: Provide additional painting at walls, in accordance with Section 09 9100 - Painting, in location directed by Architect.
 2. Unit of Measure: Square Foot (SF) of paint, in place.
 - N. Item No. 14 - Painting (Ceiling).
 1. Description: Provide additional painting at ceiling, in accordance with Section 09 9100 - Painting, in location directed by Architect.
 2. Unit of Measure: Square Foot (SF) of paint, in place.
 - O. Item No. 15 - New Concrete Slab on Grade.
 1. Description: Provide new concrete, of quality and strength to match existing and appropriate for location as determined by Architect, in location directed by Architect.
 2. Unit of Measure: Cubic Yard (CY) of concrete, in place.

END OF SECTION

**SECTION 012500
SUBSTITUTION PROCEDURES**

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

2.01 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 coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
- D. Limit each request to a single proposed substitution item.

2.02 RESOLUTION

2.03 ACCEPTANCE

END OF SECTION

**SECTION 012900
PAYMENT PROCEDURES
PAYMENT PROCEDURES**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

1.03 DEFINITIONS

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

1.04 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Contractor's name and address.
 - c. Date of submittal.
 2. Submit draft of Schedule of Values that will accompany Application for Payment.
 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for

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- operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
 10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.05 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by approving authority and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use Application and Certificate for Payment form stipulated in front-end documents as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Approving authority will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.

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2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. Contractor's Affidavits of Payment of Debts and Claims, Release of Liens, and Consent of Surety to Final Payment, if applicable.
 5. Evidence that claims have been settled.
 6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS - NOT USED
PART 3 - EXECUTION - NOT USED

END OF SECTION

**SECTION 013000
ADMINISTRATIVE REQUIREMENTS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED SECTIONS

- A. Section 01 0150 - Special Conditions: Additional Administrative and Submittal Requirements.
- B. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 REFERENCE STANDARDS

- A. CSI/CSC Form 12.1A - Submittal Transmittal; Current Edition.

1.04 PROJECT COORDINATION

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

11. Correction Punch List and Final Correction Punch List for Substantial Completion.
12. Closeout submittals.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 2. Contractor and Architect are required to use this service.
 3. It is Contractor's responsibility to submit documents in allowable format.
 4. Subcontractors, suppliers, the Architect, all of the Architect's consultants and Engineers, and the Owner are to be individual access to the service at no extra charge. Include licensed access for the Owner, Architect, and all of the Architect's Consultants and Engineers of not less than one license for each discipline or trade
 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.
- C. Submittal Service: The selected service is:
 1. Procore | Construction Management (tel: 1-866-477-6267): www.procore.com
 2. Substitutions: See Section 01 6000 - Product Requirements.
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.
- E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 REQUEST FOR INFORMATION

- A. All Pre-Bid Questions, or Requests for Information must be submitted through a prequalified General Contractor via email to the Architect's Project Manager, with a copy to Kayla Thomas (kayla.thomas@gmcnetwork.com). Pre-Bid Questions will be accepted up to 48 hours prior to Bid Opening.
- B. Send requests for information (RFI's) to Architect's Project Manager and administrative assistant, following the example form included at the end of this section.
- C. Sequentially number the Requests for Information (RFI), and date accordingly.

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- D. Explanations and interpretations will be issued via Addendum.
 - E. After award of the Bid, a Request for Information (RFI), when submitted to the Architect, may result in an Architect's Supplemental Instruction (ASI), Request for Proposal (RFP), or Construction Change Directive (CCD) prior to the issuance of a Change Order.

3.03 PRECONSTRUCTION CONFERENCES

- A. Prior to commencing any work on the project, a pre-construction conference shall be held. Mandatory attendance will be required of the General Contractor and representative of all specialty and principal subcontractors involved in the project. Time and date of said conference shall be established by the Architect after award of construction contract.
- B. Architect will schedule a meeting after Notice of Award.
- C. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- D. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties to Contract and Architect.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling.
 - 8. Other items: To be announced.
- E. Similarly, prior to commencing any major portion of the Work of the project, preconstruction conferences shall be held. Mandatory attendance will be required of the General Contractor and representative of all specialty and principal subcontractors involved in the individual major portions of project. Time and date of said conferences shall be established by the General Contractor, and the Architect, Owner, and appropriate Consultants shall be advised in writing of times and dates, by the General Contractor.
 - 1. "Major portion" may be defined as work items for each Subcontractor working on site, and shall include in part, but not be limited to, earthwork, sitework, site utilities, concrete work, masonry, Division 5, roof framing and Division 6, insulation, roofing systems, finishes, specialties, casework, mechanical, plumbing, and electrical.
- F. 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.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. The Contractor shall record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made. Emails to Project Team are acceptable.
- D. Attendance Required:

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

3.05 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.
- C. Do Not install above ceiling work prior to preparation, submission, and approval of the above ceiling Coordination Drawings .

3.06 REQUESTS FOR INTERPRETATION (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. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. 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.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
 3. Prepare using software provided by the Electronic Document Submittal Service.
 4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. 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.

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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. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - c. 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, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. 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.
 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.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. 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. Identify and include improper or frivolous RFIs.
- H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar 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.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

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- I. 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.
 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
 4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.07 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 - 013216 - Construction Progress Schedule.
 2. Coordinate with Contractor's construction schedule and schedule of values.
 3. 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.
 4. 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.

3.08 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect, using the submittal numbering tracking system, for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.09 SUBMITTALS FOR INFORMATION

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

6. Manufacturer's field reports.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- B. Submit for Owner's benefit during and after project completion.

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

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
- C. Samples: Submit no less than 3-each of any sample or color chart which is required or otherwise requested, unless more are required in individual specification sections; one of which will be retained by Architect.
1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.
- D. Refer to Section 01 0150 - "Special Conditions" for additional information and requirements.

3.12 SUBMITTAL PROCEDURES

- A. General Requirements:
1. Use a single transmittal for related items.
 2. Transmit using approved form.
 - a. Use Form CSI/CSC Form 12.1A.
 - b. Use Contractor's form, subject to prior approval by Architect.
 - c. Use form generated by Electronic Document Submittal Service software.
 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 5. 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.
 6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Deliver submittals to Architect at business address.
 - b. Deliver submittals to Construction Manager at business address.
 - c. Deliver submittals to _____ at business address.

-
- d. Send submittals in electronic format via email to Architect.
 - e. Upload submittals in electronic form to Electronic Document Submittal Service website.
 7. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
 8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 9. Provide space for Contractor and Architect review stamps.
 10. When revised for resubmission, identify all changes made since previous submission.
 11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 12. 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.
 13. Submittals not requested will not be recognized or processed.
 14. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
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.
 5. Submit sustainable design reporting submittals under separate cover.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Do not reproduce Contract Documents to create shop drawings.
 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Transmit each submittal with approved form.
- E. Transmit each submittal. Sequentially number each transmittal form according to the example shown on the sample Transmittal form provided at the end of this Section. Include the date, project number and name along with number of copies submitted.
- F. Deliver submittals to Architect at business address to the attention of the Contract Administration Coordinator.
- G. A Submittal Schedule must be submitted and approved by Architect prior to review of any and all submittals.

3.13 SCHEDULING OF INSPECTIONS

- A. Contact the design professional by email of the date the project will be ready for an inspection.
- B. The design professional will contact the Local Building Inspector to schedule the first available date for the inspection. Inspections must be requested 14 days in advance.
- C. After Building Inspector notifies design professional of time of inspection, design professional will notify Contractor, and Owner, copying Building Inspector.

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

3.14 MINIMUM REQUIREMENTS FOR REQUIRED INSPECTIONS

- A. Use the following minimum requirements to help determine if a project is ready for required inspection:
- B. PRE-CONSTRUCTION CONFERENCE.
1. Required Attendees: Contractor, Owner, Architect, Major Subcontractors.
 2. Inspection Requirements:
 - a. Signed construction contract.
 - b. Verification of payment of permit fee.
 - c. Contractor's Statement of Responsibility and Quality Assurance Plan (for storm shelter).
 - d. Fire Alarm Contractor's Certification (from State Fire Marshall).
 - e. ADEM permit, if more than 1 acre of land is disturbed.
- C. ABOVE-CEILING INSPECTION.
1. Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors.
 2. Inspection Requirements:
 - a. All work must be completed except for installation of ceiling tiles and/or hard ceilings.
 - b. Space must be conditioned.
 - c. Permanent power must be connected unless otherwise arranged with the Building Inspector.
 - d. Grease duct must be inspected and approved by the Building Inspector prior to fire wrapping and Above-Ceiling Inspection.
- D. LIFE SAFETY INSPECTIONS AND FINAL INSPECTIONS.
1. Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshall.
 2. Inspection Requirements:
 - a. Fire alarm certification.
 - b. Kitchen hood fire suppression system certification.
 - c. General Contractor's 5-Year Roofing Warranty.
 - d. Roofing manufacturer's guaranty.
 - e. Above ground and below ground sprinkler certifications.
 - f. Completed Certificate of Structural Engineers Observations for storm shelters.
 - g. Emergency and exit lighting tests.
 - h. Fire alarm must be monitored.
 - i. Elevator Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor.
 - j. Boiler/Vessels Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor.
 - k. Flush test for underground sprinkler lines (witnessed by local fire marshall, fire chief and/or Building Inspector).
 - l. Flush/pressure test for new and/or existing fire hydrants.
 - m. Must have clear egress/access and emergency (for first responders) access to building.
 - n. Must have ADA access completed.

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

END OF SECTION

SUBMITTAL NUMBERING / TRACKING

005 - 09650 - 01A

Consecutive Submittal For Project	Specification Section	First submittal for spec section 02 = 2 nd submittal for spec section	A = First time submitted for that section/item. B = Indicates resubmittal C = 3 rd submittal for same item
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INCLUDE ARCHITECT'S PROJECT NUMBER ON ALL SUBMITTAL TRANSMITTALS

**** Architect's Project No. & Name: LHUN250003 ASHVILLE FIRE STATION NO. 2
Ashville, Alabama**

REQUEST FOR INFORMATION

RFI No. _____

DATE: _____

PROJECT NAME: _____

GM&C PROJECT No. _____

FROM: _____

PROJECT MANAGER: _____

GOODWYN, MILLS & CAWOOD, INC.

2701 First Avenue South, Suite 100

Birmingham, AL 35233

REQUEST:

SIGNATURE: _____

SUGGESTION:

RESPONSE: ROUTING: _____

DATE REC'D: _____

SIGNATURE: _____

DATE RET'D: _____

DISTRIBUTION: Contract Administrator Consultant _____ _____ _____

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

**SECTION 013216
CONSTRUCTION PROGRESS SCHEDULE**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.
- B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; 2016.

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. Submit updated schedule with each Application for Payment.
- D. Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.

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.

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 (560 x 432 mm).
- C. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a 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.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules to define critical portions of the entire schedule.
- E. Include conferences and meetings in schedule.
- F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

-
- G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
 - H. Indicate delivery dates for owner-furnished products.
 - I. Provide legend for symbols and abbreviations used.
 - J. Show total float for each construction activity.

3.03 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

3.04 NETWORK ANALYSIS

- A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.
- B. 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.
- C. 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.
- D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and recomputation of all dates and float.
- E. 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. By responsibility in order of earliest possible start date.
 - 4. In order of latest allowable start dates.
 - 5. In order of latest allowable finish dates.
 - 6. Contractor's periodic payment request sorted by Schedule of Values listings.
 - 7. Listing of basic input data that generates the report.
 - 8. 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.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.
- G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

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

END OF SECTION

**SECTION 014000
QUALITY REQUIREMENTS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. Testing and inspection agencies and services.
- D. Control of installation.
- E. Mock-ups.
- F. Tolerances.
- G. Manufacturers' field services.
- H. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Submittal procedures.
- B. Section 01 4223 - Reference Standards and Definitions.
- C. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2024.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
- G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: For integrated exterior and interior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions
 - 3. Fire Protection: Sprinkler shop drawings shall include PE stamp of Professional Engineer licensed in the state in which the project is located.
- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- D. Schedule of Submittals.

-
- E. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- F. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- G. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- H. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- I. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- J. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
- K. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.

1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.05 QUALITY ASSURANCE

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

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 3. Laboratory: Authorized to operate in the State in which the Project is located.
 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.
- D. Refer to Section 01 0150 - "Special Conditions" for additional information and requirements.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated 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. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- D. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- E. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
 - 1. Architect will issue written comments within seven (7) 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.
- F. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- G. 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.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 6. Build mock-up in the following 3 phases (minimum). Obtain approval of each phase from Architect before proceeding.
 - a. Substrate construction, and waterproofing.
 - b. Opening installation, and flashing.
 - c. Veneer. (Divide this into multiple phases of mock-up if there are multiple layers.)
 - 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 8. Protect mock-ups from the elements with weather-resistant membrane.
 - 9. Demolish and remove mockups when directed unless otherwise indicated.
- I. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting 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 required.
- B. Testing Agency Duties:
1. Test samples of mixes submitted by Contractor.
 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 6. Perform additional tests and inspections required by Architect.
 7. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the Work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Price.
- F. Refer to Section 01 0150 - "Special Conditions" for additional information and requirements.

3.05 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 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 complying with specified requirements.

END OF SECTION

SECTION 01410
QA/QC, STRUCTURAL TESTS, & STRUCTURAL SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements required for compliance with the International Building Code, Chapter 17, Structural Tests and Special Inspections as well as specific quality-assurance and -control requirements for individual construction activities as referenced in the Sections that specify those activities. Section further includes administrative and procedural requirements required for compliance with the International Code Council's ICC 500-2020 Standard for the Design and Construction of Storm Shelters, Special Inspections, quality-assurance plan and Contractor responsibility.
- B. Structural testing and special inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve contractor of responsibility for compliance with other construction document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities or herein. Requirements in those Sections or herein may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the construction document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by architect, owner, or authorities having jurisdiction are not limited by provisions of this section.
- C. The owner will engage one or more qualified special inspectors and / or testing agencies to conduct structural tests and special inspections specified in this section and related sections and as may be specified in other divisions of these specifications.

1.3 DEFINITIONS

- A. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official and the Structural Engineer of Record.
- B. Construction Documents: Written (including specifications), graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction Documents include all supplemental instructions, sketches, addenda, and revisions to the drawings and specifications

issued by the registered design professional beyond those issued for a building permit.

- C. Shop Drawings / Submittal Data: Written, graphic and pictorial documents prepared and / or assembled by the contractor based on the Construction Documents.
- D. Structural Observation: Visual observation of the structural system by a representative of the registered design professional's office for general conformance to the approved construction documents. Structural observations are not considered part of the structural tests and special inspections and do not replace inspections and testing by the testing agency or special inspector.
- E. Special Inspector: A qualified person who demonstrating competence, to the satisfaction of the code enforcement official and registered design professional in responsible charge, for inspection of the particular type of construction or operation requiring special inspection. The special inspector shall be a licensed professional engineer or engineering intern or a qualified representative from the testing agency.
- F. Special Inspection, Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- G. Special Inspection, Periodic: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.
- H. Testing Agency: A qualified materials testing laboratory under the responsible charge of a licensed professional engineer, approved by the code enforcement official and the registered design professional in responsible charge, to measure, examine, test, calibrate, or otherwise determine the characteristics or performance of construction materials and verify confirmation with construction documents.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 - 1. Minimum qualifications of inspection and testing agencies and their personnel shall comply with ASTM E329-03 Standard Specification for Agencies in the Testing and / or Inspection of Materials Used in Construction.
 - a. Inspectors and individuals performing tests shall be certified for the work being performed as outlined in the appendix of the ASTM E329. Certification by organizations other than those listed must be submitted to the building official for consideration before proceeding with work.
 - 2. Additional minimum qualifications of inspection and testing agencies and their personnel inspecting and testing concrete and concrete related work shall be as follows:
 - a. An independent agency, acceptable to the Structural Engineer of Record qualified according to ASTM C 1077.
 - b. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - c. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

3. In addition to these requirements, local jurisdiction may have additional requirements. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.

1.5 CONFLICTING REQUIREMENTS, REPORTS, AND TEST RESULTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the registered design professional in responsible charge for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the registered design profession in responsible charge for a decision before proceeding.
- C. The special inspector's reports and testing agencies results shall have precedence over reports and test results provided by the contractor.
- D. Where a conflict exists between the construction documents and approved shop drawings / submittal data, the construction documents shall govern unless the shop drawings / submittal data are more restrictive. All conflicts shall be brought to the attention of the registered design professional in responsible charge.

1.6 SUBMITTALS BY SPECIAL INSPECTOR AND / OR TESTING AGENCY

- A. Special inspectors shall keep and distribute records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge, contractor, architect, and owner. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon by the permit applicant and the building official prior to the start of work.
 1. Special inspection reports and test results shall include, but not be limited to, the following:
 - a. Date of inspection.
 - b. Description of inspections or tests performed including location (reference grid lines, floors, elevations, etc.).
 - c. Statement noting that the work, material, and / or product conforms or does not conform to the construction document requirements.
 1. Name and signature of contractor's representative who was notified of work, material, and / or products that do not meet the construction document requirements.
 - d. Name and signature of special inspector and / or testing agency representative performing the work.

- e. Additional information as required herein.

- B. Schedule of Non-Compliant Work: Each agent shall maintain a log of work that does not meet the requirements of the construction documents. Include reference to original inspection / test report and subsequent dates of re-inspection / retesting.

- C. Reports and tests shall be submitted within 1 week of inspection or test. Schedule of Non-Compliant Work shall be updated daily and submitted at monthly intervals.

- D. Concrete Test Reports: Test results shall be reported in writing to Architect, Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain:
 - 1. Project identification name and number.
 - 2. Date and time of concrete placement.
 - 3. Mix design number or identification.
 - 4. Design compressive strength at 28 days.
 - 5. Design Air Content.
 - 6. Design Slump.
 - 7. Location of concrete batch in Work.
 - 8. Time concrete was batched.
 - 9. Amount of water withheld at plant.
 - 10. Amount of water added at site.
 - 11. Temperature of mix at point of placement.
 - 12. Slump at point of placement
 - a. When use of a Type I or II plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C494 is used, slump shall be measured and report both before addition of the admixture and at the point of placement.
 - 13. Air content.
 - 14. Name of concrete testing and inspecting agency.
 - a. Name of Laboratory Technician and ACI Certification Number.
 - b. Name of Field Technician and ACI Certification Number.
 - 15. Compressive breaking strength.
 - 16. Type of break.

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

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITY

- A. The contractor shall coordinate the inspection and testing services with the progress of the work. The contractor shall provide sufficient notice to allow proper scheduling of all personnel. The contractor shall provide safe access for performing inspection and on site testing.
- B. The contractor shall submit schedules to the owner, registered design professionals and testing and inspecting agencies. Schedules will note milestones and durations of time for materials requiring structural tests and special inspections.
- C. Each contractor responsible for the construction of the building or storm shelter lateral force-resisting system or a component listed in quality assurance plan shall submit a written statement of responsibility to the building official and the owner prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain the following:
 - 1. Acknowledgment of awareness of the special requirements contained in the quality assurance plan.
 - 2. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official.
 - 3. Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of the reports.
 - 4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.
- D. The contractor shall also coordinate the Structural Observations of the registered design professional to conduct visual observations of the construction of structural elements and shelter structural systems as follows:
 - 1. Building: Periodic and/or prior to pre-determined major construction milestones
 - 2. Shelter: Prior to concrete placement for the first segment of reinforced foundation
 - 3. Shelter: Prior to grouting of the first lift of reinforced masonry wall (segment)
 - 4. Shelter: Prior to grouting of the first segment of T/Wall bond beam
 - 5. Shelter: Prior to concrete placement for the first portion of reinforced topping slab over precast hollow core slab panels
 - 6. Shelter: Prior to concrete placement for the first portion of reinforced slab-on-grade
- E. The contractor shall repair and / or replace work that does not meet the requirements of the construction documents.
 - 1. Contractor shall engage an engineer / architect to prepare repair and / or replacement procedures.
 - 2. Engineer / architect shall be registered in the state in which the project is located. Engineer shall be acceptable to the registered design professional in responsible charge, code enforcement official, and owner.
 - 3. Procedures shall be submitted for review and acceptance by the registered design professional in responsible charge, code enforcement official, and owner before proceeding with corrective action.
- F. The contractor shall be responsible for costs of:
 - 1. Re-testing and re-inspection of materials, work, and / or products that do not meet the requirements of the construction documents and shop drawings / submittal data.
 - 2. Review of proposed repair and / or replacement procedures by the registered design professional in responsible charge and the inspectors and testing agencies.
 - 3. Repair or replacement of work that does not meet the requirements of the construction documents.

3.2 STRUCTURAL OBSERVATIONS

- A. Structural observations may be made periodically as determined by the registered design professional in responsible charge.
- B. Structural observations of storm shelter's structural system shall be for general conformance to the approved construction documents at significant construction stages and at completion of the construction of the structural system. Structural observation shall not obviate the need for other inspections or testing required by this specification or the applicable building code.

3.3 TESTING AND INSPECTION

- A. Testing and inspection shall be in accordance with the attached Schedule of Special Inspections, as listed elsewhere in the project documents, and as listed herein.
- B. Inspection of Fabricator's QC procedures
 - 1. Review the quality control procedures of the following fabricators for completeness and adequacy relative to the fabricator's scope of work: steel fabricator.
 - a. Exception: AISC Certified Steel Fabricators that submit a "Certificate of Compliance" at completion of their scope of work.
- C. Soils and Deep Foundations, Continuous Inspection
 - 1. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of compacted fill.
 - 2. Verification and inspection of driven deep foundations
 - a. Verify element materials, sizes and lengths comply with the requirements.
 - b. Determine capacities of test elements and conduct additional load tests, as required.
 - c. Observe driving operations and accurate elements for each element.
 - d. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations required to achieve design capacity, record tip and butt elevations and document any damage to foundation element.
 - e. Inspect installation of pile foundations, including installation of test piles.
 - 1. As recommended in approved soils report and specified in pile specifications.
 - 3. Verification and inspection of cast-in-place deep foundation elements.
 - a. Observe drilling operations and maintain complete and accurate records for each element.

- b. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.
 - c. Inspect installation of drilled pier foundations, including installation of test piers. Inspect reinforcing in each pier and test concrete.
 1. As recommended in approved soils report and specified in pile specifications.
 4. Verification and inspection of post-installed foundation anchors.
 - a. Verify installation equipment used, anchor dimensions, tip elevations, final depth and final installation torque.
 - b. Verify any additional requirements recommended by anchor manufacturer.
 - c. Inspect installation of anchors, including installation of test anchors.
 1. As recommended in approved soils report and specified in anchor specifications.
- D. Soils, Periodic Inspection.
1. Verify bearing capacities of soils beneath footings is in accordance with the approved project soils report and earthwork specifications.
 2. Verify assumed bearing capacities (As noted on the drawings, recommended by the geotechnical engineer, and specified in earthwork specifications.) and determine settlements of soils beneath footings and building pad.
 3. Verify site preparation prior to beginning fill placement. Verify fill material type, placement method, lift thickness, and compaction of fill material. Verify in-place density of compacted fill.
 - a. As recommended in approved soils report and specified in earthwork specifications.
- E. Concrete, Continuous Inspection
1. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - a. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd, but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - b. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not

less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - a. Unit Weight is only required for lightweight concrete
6. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimens at 7 days, one set of two specimens at 28 days, and hold one in reserve for later testing as directed by the Structural Engineer of Record.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
7. Inspect welded shear reinforcement.
8. Inspect bolts to be installed prior to and during placement of concrete.
9. Inspect concrete placement to verify operations are in accordance with project requirements.
 - a. Verify correct mix is used.

F. Concrete, Periodic Inspection

1. Floor flatness:
 - a. Measure floor and slab flatness and levelness according to ASTM E 1155 within **24** hours of finishing..
2. Inspect concrete formwork prior to concrete placemen, except as noted. Verify that construction joints are properly keyed. Verify that slab recesses, if any, have been installed.
3. Inspect reinforcing steel prior to concrete placement, except as noted, for installation including size, spacing and bar clearances. Verify that lap splices and embedment lengths are per the construction documents. Verify that dowels for work above are properly aligned and spaced to match other work.
4. Inspect all concrete curing operations and verify they are in accordance with project requirements.
5. Erection of precast concrete members.

- a. Inspect all connections.
 6. Inspect the weldability of steel, before use in fabrication, where reinforcing steel is specified to be welded by the construction documents.
 7. Inspect the installation of anchors installed in hardened concrete.
- G. Inspect Hollow Core Panels
1. Inspect panel placement.
 2. Inspect panel connection to structure.
- H. Masonry, Continuous Inspection
1. Inspect grouting operations to ensure compliance with code and construction documents.
 2. Inspect masonry cells and cleanouts prior to placement of grout. Inspect placement of all grout.
 3. Inspect type size and location of anchors, including details of anchorage of masonry to structural members, frames or other construction.
 4. Inspect welding of reinforcing bars.
 5. Inspect preparation of grout specimens, mortar specimens and / or prisms.
- I. Masonry, Periodic Inspection
1. At beginning of masonry construction:
 - a. Inspect proportions of site prepared mortar and grout.
 - b. Inspect construction of mortar joints.
 - c. Inspect reinforcement for correct size and spacing.
 2. At beginning of masonry construction and every 1000 square feet of masonry thereafter
 - a. Inspect work for size and location of structural elements
 - b. Inspect work for correct location and type of embeds and anchor bolts.
 - c. Specified size, grade, and type of reinforcement.
 3. Prior to grouting
 - a. Inspect masonry cells and cleanouts prior to placement of grout. Verify spaces are clear.
 - b. Inspect any site prepared grout proportions.

- c. Inspect placement of reinforcement and connectors.
 - d. Inspect construction of mortar joints
 - 4. Inspect protection of masonry during cold weather and hot weather.
 - a. During periods with temperatures below 40 degrees or above 90 degrees.
 - 5. Verify compliance with all required inspection provisions of the construction documents and approved submittals.
- J. Steel Construction, Continuous Inspection
 - 1. Inspect welding: Structural Steel:
 - a. Complete and partial penetration groove
 - 1. Perform Continuous Inspection during the Welding Operations to verify compliance with approved WPS.
 - 2. All Complete and partial penetration groove shall be non-destructively tested using the most appropriate (according to AWS D1.1 and AWS B1.10 recommendations and as approved by the Structural Engineer of Record) method from the following:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not to be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94
 - 3. All Complete and partial penetration groove shall additionally be visually inspected.
 - b. Multipass fillet welds.
 - 1. Perform Continuous Inspection during the Welding Operations to verify compliance with approved WPS.
 - c. Single-pass fillet welds > 5/16
 - 1. Perform Continuous Inspection during the Welding Operations to verify compliance with approved WPS.
- K. Steel Construction, Periodic Inspection
 - 1. Inspect high-strength bolts, nuts and washers:

- a. Identify markings to conform to ASTM standards specified in the construction document.
 - b. Inspect manufacturer's certificate of compliance.
2. Inspect high-strength bolting: Bearing-type connections.
3. Inspect high-strength bolting: Slip Critical connections.
 - a. EXCEPTION: Inspect high-strength bolting: Bearing-type connections. Continuous monitoring required for pretensioning using calibrated wrench method or turn-of-nut method without matchmarking.
4. Inspect and verify structural steel material:
 - a. Identification markings to conform to ASTM standards specified in the approved construction documents.
 - b. Manufacturers' certified mill test reports.
5. Inspect and verify weld filler materials:
 - a. Identification markings to conform to AWS specification in the approved construction documents.
 - b. Manufacturer's certificate of compliance required
6. Inspect welding: Structural Steel:
 - a. Single-pass fillet welds $\leq 5/16$
 - b. Floor and deck welds.
7. Inspect steel frame joint details for compliance with approved construction documents:
 - a. Details such as bracing and stiffening.
 - b. Member locations.
 - c. Application of joint details at each connection.
8. Verify members in moment frames and braced frames (beams, columns, braces, and connection material) which are ASTM A6 Group 3 4, and 5 shapes with flange $1 \frac{1}{2}$ inch thick and thicker, and plates that are 2 inch or thicker have a minimum Charpy V-Notch (CVN) toughness of 20 ft-lbf at 70 deg F, determined as specified in LRFD (1999) Specification Section A3.1c.
9. Verify all welds in moment and braced frames (beams, columns, braces, and connection material) shall be made with a filler metal that can produce welds that have a minimum Chary V-Notch toughness of 20 ft-lbf at minus 20 deg F, as determined by AWS classification or manufacturer certification.

10. Verify Steel Backing, Weld Tabs, and Tack Welds are in accordance with Specification Section 05120.

11. Verification of structural steel deck material. (Table 1704.3)

a. Manufacturer's certified test reports.

L. Cold Formed Metal Trusses, Periodic Inspection

1. Inspect metal roof trusses and shop built components.

a. Inspect truss production in shop unless fabricator is approved by building official and submits certification of compliance at end of scope of work. Inspect 10% of trusses. Inspect 100% of trusses if discrepancies are observed.

2. Inspect site-built assemblies, including site built trusses. Inspect erected trusses, including bridging and attachments.

a. Inspect all site-built trusses. Inspect erected trusses and installation of bridging.

b. Site-built trusses shall be periodically inspected for member size, type, and gage.

c. Site-built trusses shall be continuously inspected (each truss) for connection including number and size of screws and spacing and fit up of joints.

3. Inspect connection of truss elements, including number of screws and attachment of connections of individual truss components.

4. Inspect trusses for damage.

5. Trusses shall be reviewed for fit-up in structure.

6. Inspect truss to truss connections and truss to structure connections.

7. Inspect high-load diaphragms.

a. Inspect all diaphragms after installation is complete.

8. Inspect restraint/bracing.

a. Inspect all bridging and bracing installation.

b. For trusses spanning greater than 60ft, verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

M. Wood, Periodic Inspection

1. Inspect fabricated wood trusses and shop built components.

a. Inspect truss production in shop unless fabricator is approved by building official and submits certification of compliance at end of scope of work. Inspect 10% of

trusses. Inspect 100% of trusses if discrepancies are observed.

2. Inspect the installation of wood trusses spanning greater than 60 feet.
 - a. Verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.
3. Inspect site-built assemblies, including site built trusses. Inspect erected trusses including bridging and attachments.
 - a. Inspect all site-built trusses. Inspect erected trusses and installation of bridging.
4. Inspect high-load diaphragms.
 - a. Inspect all diaphragms after rough carpentry is complete.

N. Special Inspection for Wind Resistance (MWFRS & Storm Shelter), Periodic Inspection

1. Roof Cladding and Roof Framing Connections.
2. Wall Connections to Roof and Floor
3. Diaphragms and Framing
4. Roof and Floor Diaphragm Systems, including Collectors, Drag Struts, and Boundary Elements.
5. Vertical Wind Force-Resisting Systems, including Braced Frames, Moment Frames, and Shearwalls
6. Windforce-Resisting System Connections to the Foundation.
7. Fabrication and installation of components and assemblies required to meet the impact resistance requirements of Section 1609.1.4.

O. Special Inspection for Seismic Resistance, Periodic

1. Inspect nailing, bolting, anchoring and other fastening of components within the seismic force-resisting system including drag-struts, braces and hold-downs.
2. Inspect welding operations of cold-formed steel framing elements of the seismic-force-resisting system.
3. Inspect screw attachment, bolting, anchoring and other fastening of cold-formed steel framing components within the seismic-force-resisting system.
4. Test masonry f'm.
5. Test for each 5000 sf of masonry.
6. Verification of proportions of materials in mortar and grout as delivered to the site.

7. Verify reinforcing steel weldability.
 8. Submit certificate of compliance for designated seismic system components.
 9. Visual observation of structural system by registered design professional for general conformance to approved construction documents (including addenda and approved changes) at significant stages and at completion.
- P. Reference related specifications for the minimum level of inspections and testing. Provide additional inspections and testing as necessary to determine compliance with the construction drawings.

PART 4 – FORMS AND SCHEDULES (ATTACHED)

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- | | |
|--|--|
| <input type="checkbox"/> Soils and Foundations | <input type="checkbox"/> Spray Fire Resistant Material |
| <input type="checkbox"/> Cast-In-Place Concrete | <input type="checkbox"/> Wood Construction |
| <input type="checkbox"/> Precast Concrete | <input type="checkbox"/> Exterior Insulation and Finish System |
| <input type="checkbox"/> Masonry | <input type="checkbox"/> Mechanical & Electrical Systems |
| <input type="checkbox"/> Structural Steel | <input type="checkbox"/> Architectural Systems |
| <input type="checkbox"/> Cold-Formed Steel Framing | <input type="checkbox"/> Special Cases |

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Special Inspection Coordinator		
2. Inspector		
3. Inspector		
4. Testing Agency		
5. Testing Agency		
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Final Report of Special Inspections

Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

(Type or print name)

Signature

Date

Licensed Professional Seal

Agent's Final Report

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Agent of the Special Inspector

(Type or print name)

Signature

Date

*Licensed Professional Seal or
Certification*

Contractor's Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated in the Quality Assurance Plan must submit a Statement of Responsibility.

Project:

Contractor's Name:

Address:

License No.:

Description of designated building systems and components included in the Statement of Responsibility:

Contractor's Acknowledgment of Special Requirements

I hereby acknowledge that I have received, read, and understand the Quality Assurance Plan and Special Inspection program.

I hereby acknowledge that control will be exercised to obtain conformance with the construction documents approved by the Building Official.

Signature

Date

Contractor's Provisions for Quality Control

Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of reports is attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement.

Fabricator's Certificate of Compliance

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project:

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the approved construction documents.

Signature

Date

Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual

SCHEDULE OF SPECIAL INSPECTIONS

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
1.00	Fabricators			
1.01	Review the quality control procedures of the following fabricators for completeness and adequacy relative to the fabricator's scope of work: steel fabricator, CFS truss fabricator, wood truss fabricator, hollow core slab plank manufacturer.	Periodic		OTA
1.02	The following fabricators, if registered and approved by the building official, may submit "Certificates of Compliance" at the completion of their scope of work that their fabricated items were constructed in accordance with the approved construction documents: steel fabricator, CFS truss fabricator, wood truss fabricator, hollow core slab plank manufacturer.	Periodic		OTA
2.00	Soils and Deep Foundations			
2.01	Verify bearing capacities of soils beneath footings.	Periodic	As recommended in approved soils report and specified in earthwork specifications.	OTA
2.02	Verify assumed bearing capacities and determine settlements of soils beneath footings and building pad.	Periodic	As noted on the drawings, recommended by the geotechnical engineer, and specified in earthwork specifications.	OTA
2.03	Verify site preparation prior to beginning fill placement. Verify fill material type, placement method, lift thickness, and compaction of fill material. Verify in-place density of compacted fill.	Periodic	As recommended in approved soils report and specified in earthwork specifications.	OTA
2.04	Inspect installation of post-installed foundation anchors, including installation of test anchors.	Continuous	As recommended in approved soils report and specified in anchor specifications.	OTA
3.00	Concrete Construction			
3.01	Spread footings are excepted from the inspections listed below.			OTA
3.02	Continuous footings are excepted from the inspections listed below.			OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
3.03	Slabs on grade are excepted from the inspections listed below.			OTA
3.04	Concrete foundation walls are excepted from the inspections listed below.			
3.05	Concrete cast on non-composite form deck is excepted from the inspections listed below.			
3.06	Inspect concrete formwork except as noted above for proper dimensions. Verify that construction joints are properly keyed. Verify that slab recesses, if any, have been installed.	Periodic	Prior to each pour.	OTA
3.07	Inspect reinforcing steel except as noted above for installation including size, spacing and bar clearances. Verify that lap splices and embedment lengths are per the construction documents. Verify that dowels for work above are properly aligned and spaced to match other work.	Periodic	Prior to each pour.	OTA; SDG & OTA for Storm Shelter
3.08	Inspect weldability of reinforcing steel other than ASTM A706.	Periodic	Prior to fabrication.	OTA
3.09	Inspect welded shear reinforcement.	Continuous	During installation.	OTA
3.10	Inspect all other welded reinforcement.	Periodic	Prior to pour.	OTA
3.11	Inspect bolts	Periodic		OTA
3.12	Inspect bolts to be installed in concrete prior to and during placement of concrete.	Continuous	During placement and concreting operations.	OTA
3.13	Verify each proposed concrete mix for the project.	Periodic	For each proposed mix.	OTA
3.14	Sample all concrete for strength tests and test concrete for slump, air content, temperature, and other tests.	Continuous	During placement operations. Reference concrete specifications for specific tests and frequencies.	OTA
3.15	Inspect concrete placement except as noted above.	Continuous		OTA
3.16	Inspect all concrete curing operations as noted in the extents column.	Periodic	Monitor during hot, cold and windy conditions. Reference concrete specifications.	OTA
3.17	Erection of precast concrete members.	Periodic	Inspect all connections.	OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
3.18	Verification of in-situ concrete strength prior to removal of forms and shores supporting weight of concrete.	Periodic	Prior to form or shoring removal.	
3.19	Verification of in-situ concrete strength prior to removal of forms and shores supporting weight of concrete.	Periodic	Prior to form or shoring removal.	OTA
3.20	Verification of in-situ concrete strength prior to backfilling walls.	Periodic	Prior to backfilling operations.	OTA
3.21	Inspect Post installed anchors, expansion	Periodic		OTA
3.22	Inspect Post installed anchors, epoxy anchors	Continuous		OTA
4.00	Masonry Construction			
4.01	Masonry foundation walls are excluded from inspections listed below.			OTA
4.02	Inspect proportions of site prepared mortar and grout. Inspect construction of mortar joints. Inspect reinforcement for correct size and spacing. Inspect work for correct location and type of embeds and anchor bolts. Inspect work for size and location of structural elements.	Periodic	At beginning of masonry construction and every 1000 square feet of masonry thereafter.	OTA
4.03	Inspect masonry cells and cleanouts prior to placement of grout. Inspect grout proportions. Inspect placement of reinforcement.	Periodic	Prior to grouting of masonry.	OTA
4.04	Inspect grouting operations to ensure compliance with code and construction documents.	Continuous	During grouting.	OTA
4.05	Inspect proportions of site prepared mortar and grout. Inspect placement of masonry units and construction of mortar joints. Inspect reinforcement for correct size and spacing. Inspect work for correct size and location of structural elements.	Periodic	At beginning of masonry construction and every 1000 square feet of masonry thereafter.	OTA
4.06	Inspect masonry cells and cleanouts prior to placement of grout. Inspect placement of all grout.	Continuous	During grouting.	OTA
4.07	Inspect type size and location of anchors, including details of anchorage of masonry to structural members, frames or other construction.	Continuous	During installation of anchors.	OTA
4.08	Inspect welding of reinforcing bars.	Continuous	During installation and welding of all reinforcing.	OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
4.09	Inspect protection of masonry during cold weather and hot weather.	Periodic	During periods with temperatures below 40 degrees or above 90 degrees.	OTA
4.10	Inspect preparation of grout specimens, mortar specimens and / or prisms.	Continuous	During preparation of all specimens.	OTA
4.11	Verify compliance with all required inspection provisions of the construction documents and approved submittals.	Periodic	As required for duration of project.	OTA
5.00	Steel Construction			
5.01	Inspect high-strength bolts, nuts and washers: a. Identify markings to conform to ASTM standards specified in the construction documents. b. Inspect manufacturer's certificate of compliance.	Periodic	Reference project specifications and ASTM material specifications; AISC 335, (Sect A3.4); AISC LRFD (Sect A3.3).	OTA
5.02	Inspect high-strength bolting: Bearing-type connections.	Periodic		OTA
5.03	Inspect high-strength bolting: Slip-critical connections.	Periodic or Continuous	Continuous monitoring required for pretensioning using calibrated wrench method or turn-of-nut method without matchmarking.	OTA
5.04	Inspect and verify structural steel material: a. Identification markings to conform to ASTM standards specified in the approved construction documents. b. Manufacturers' certified mill test reports.	Periodic	Confirm that materials meet applicable ASTM specifications noted in construction documents.	OTA
5.05	Inspect and verify weld filler materials: a. Identification markings to conform to AWS specification in the approved construction documents. b. Manufacturer's certificate of compliance required.	Periodic	Confirm that materials meet applicable ASTM specifications noted in construction documents.	OTA
5.06	Inspect welding: Structural Steel: 1) Complete and partial penetration groove 2) Multipass fillet welds. 3) Single-pass fillet welds $> 5/16$ "	Continuous	Per specifications and AWS D1.1	OTA
5.07	Inspect welding: Structural Steel: 1) Single-pass fillet welds $\leq 5/16$ " 2) Floor and deck welds.	Periodic	Per specifications and AWS D1.1	OTA
5.08	Inspect steel frame joint details for compliance with approved construction documents: a. Details such as bracing and stiffening. b. Member locations. c. Application of joint details at each connection.	Periodic	Inspect complete frame.	OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
5.09	Inspect and verify steel deck attachment.	Periodic		OTA
6.00	Special Inspections for Wind Resistance			
6.01	Roof Cladding and Roof Framing Connections	Periodic		OTA
6.02	Wall Connections to Roof and Floor Diaphragms and Framing	Periodic		OTA
6.03	Roof and Floor Diaphragm Systems, including Collectors, Drag Struts, and Boundary Elements.	Periodic		OTA
6.04	Vertical Windforce-Resisting Systems, including Braced Frames, Moment Frames, and Shearwalls	Periodic		OTA
6.05	Windforce-Resisting System Connections to the Foundation.	Periodic		OTA
6.06	Fabrication and installation of components and assemblies required to meet the impact-resistance requirements of Section 1609.1.4.	Periodic		OTA
7.00	Special Inspections for Wind Resistance - Storm Shelter			
7.01	Roof Cladding	Periodic		OTA
7.02	Roof Framing Connections	Periodic		SDG & OTA
7.03	Wall Connections to Roof and Floor Diaphragms and Framing	Periodic		SDG & OTA
7.04	Roof and Floor Diaphragm Systems, including Collectors, Drag Struts, and Boundary Elements.	Periodic		SDG & OTA
7.05	Vertical Windforce-Resisting Systems, including Braced Frames, Moment Frames, and Shearwalls	Periodic		SDG & OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
7.06	Windforce-Resisting System Connections to the Foundation.	Periodic		SDG & OTA
7.07	Fabrication and installation of components and assemblies required to meet the impact-resistance requirements of Section 1609.1.4.	Periodic		OTA
8.00	Special Inspections for Seismic Resistance			
8.01	Inspect structural welding in accordance with AISC 341.	Continuous	Exceptions: 1. Single-pass fillet welds not exceeding 5/16 inch in size.	OTA
8.02	Inspect nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system including drag-struts, braces and hold-downs	Periodic		OTA
8.03	Inspect welding operations of cold-formed steel framing elements of the seismic-force-resisting system.	Periodic		OTA
8.04	Inspect screw attachment, bolting, anchoring and other fastening of cold-formed steel framing components within the seismic-force-resisting system.	Periodic		OTA
8.05	Certificates of compliance used in masonry construction		Prior to construction.	OTA
8.06	Verify masonry <i>f_m</i> .		Prior to construction.	OTA
8.07	Test masonry <i>f_m</i> .	Periodic	Test for each 5000 sf of masonry.	OTA
8.08	Verification of proportions of materials in mortar and grout as delivered to the site	Periodic		OTA
8.09	Review certified mill test reports of all concrete reinforcing.			OTA
8.10	Verify reinforcing steel weldability			OTA
8.11	Submit certificate of compliance for designated seismic system components			OTA
8.12	Visual observation of structural system by registered design professional for general conformance to approved construction documents (including addenda and approved changes) at significant stages and at completion.	Periodic		SDG

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
9.00	Cold Formed Steel Framing Construction			
9.01	Inspect exterior wall infill including installed studs' sizes and attachments.	Periodic		OTA
9.02	Inspect roof trusses assembly/framing and attachments.	Periodic		OTA
9.03	Verify size and gage of load bearing studs.	Periodic		OTA
9.04	Verify load bearing framing spacing, configuration and attachments.	Periodic		OTA
9.05	Verify load bearing bracing and blocking	Periodic		OTA
9.06	Proper seating of studs in track.	Periodic		OTA
9.07	Stud header size, gauge, and construction per structural drawings for load bearing walls.	Periodic		OTA
9.08	Screw attachments, bolting, anchoring, and other fastening of components per structural drawings.	Periodic		OTA
9.09	Welding of elements per structural drawings.	Periodic		OTA
9.10	Where a cold-formed steel truss clear span is 60 feet or greater, verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.	Periodic		OTA
INSPECTION AGENTS				
#	Firm, Address, Telephone			
OTA	Owner's Testing Agent			
SDG	SDG -- 300 Chase Park South, Suite 125, Hoover, AL 35244 -- (205) 824 - 5200			
<p><i>Note: The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Inspection Agent(s) may be subject to the approval of the Building Official.</i></p> <p>Is the Schedule of Special Inspection Services part of a Quality Assurance Plan as defined in Sections 1705 or 1706 of the Building Code? _____</p>				

**SECTION 014100
REGULATORY REQUIREMENTS**

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

- A. Regulatory requirements applicable to this project are the following:
- B. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 014223
REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 DEFINITIONS:

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Indicated: The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.
- C. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Architect," "requested by the Architect," and similar phrases.
- D. Approve: The term "approved," where used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- E. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
- G. Install: The term "install" is used to describe operations at project site including the actual "unloading, temporary storage, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
- H. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
- I. Installer:
 - 1. An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - 2. The term "experienced," when used with the term "Installer," means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
- J. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
- K. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land on which the Project is to be built.

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1. If areas available are not indicated, they will be as mutually agreed by Owner and Contractor at Preconstruction Conference and as modified during construction.
 - L. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
 - M. OFCI - Owner Furnished, Contractor Installed.
 - N. OFOI: Owner Furnished, Owner Installed.
 1. Equipment indicated on the drawings with the (OFOI) symbol designates the Owner will supply and deliver to the project site any equipment and finish items specified in these specifications and the Owner install the equipment and finish items in place ready for intended use.
 2. The Owner shall furnish all standard integral parts of the equipment and finishes, and tailgate-deliver items to project site.
 3. Owner shall receive items at site and give written receipt for items at time of delivery, noting visible defects or omissions. If such declaration is not given, the Owner shall assume responsibility for such defects and omissions. Contractor shall be responsible for cooperating with the Owner who shall provide unloading, handling and proper storage of equipment prior to installation at the site. The Owner and the Contractor will coordinate deliveries of equipment and finish items to coincide with construction schedule to minimize storage of equipment before installation.
 4. Owner shall uncrate, assemble, set items in place, and install items in accordance with manufacturer's instructions.
 5. Contractor shall provide utility rough-in for equipment items where required regardless of equipment responsibility designation unless specifically noted otherwise.
 6. Contractor shall be responsible for verification of utility requirements for approved equipment items. Upon request, the Owner shall make available dimensions and power characteristics of the Owner-furnished items.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION:

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 50-Division format and MASTERFORMAT numbering system.
- B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 1. Abbreviated Language:
 - a. Language used in Specifications and other Contract Documents is the abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.
 2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

1.04 INDUSTRY STANDARDS:

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with the standard in effect as of the date of the Contract Documents.
- C. Conflicting Requirements:
 - 1. Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different, but apparently equal, and uncertainties to the Architect for a decision before proceeding.
 - 2. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- D. Copies of Standards:
 - 1. Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 2. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

1.05 DRAWING SYMBOLS:

- A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., seventh edition.
- B. Mechanical/Electrical Drawings: Graphic symbols used on mechanical and electrical drawings are generally aligned with symbols recommended by ASHRAE. Where appropriate, these symbols are supplemented by more specific symbols as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to the Architect/Engineer for clarification before proceeding.

1.06 SUBMITTALS:

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

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

**SECTION 014533
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

1.02 RELATED REQUIREMENTS

1.03 DEFINITIONS

- A. Code or Building Code: ICC (IBC), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. AISC 341 - Seismic Provisions for Structural Steel Buildings; 2022.
- C. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2025).
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- E. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2025b.
- F. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2025.
- G. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- H. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- I. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
- J. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2019 (Reapproved 2023).
- K. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019 (Reapproved 2023).

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- L. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - M. ICC (IBC)-2018 - International Building Code; 2018.

1.05 SUBMITTALS

- A. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
 - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- B. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.
- C. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of special inspection.
 - h. Date of special inspection.
 - i. Results of special inspection.
 - j. Compliance with Contract Documents.
 - 2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- D. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test or inspection.
 - h. Date of test or inspection.
 - i. Results of test or inspection.
 - j. Compliance with Contract Documents.

1.06 SPECIAL INSPECTION AGENCY

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- A. Owner or Architect will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
 - B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.
 - C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 TESTING AND INSPECTION AGENCIES

- A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
 - 1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
 - 2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

- A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC)-2018.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M, and ACI CODE-318, Sections 5.6 and 5.8 and record the following, continuous:
 - 1. Slump.
 - 2. Air content.
 - 3. Temperature of concrete.

3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

- A. Masonry Structures Subject to Special Inspection:
 - 1. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
 - 2. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".
- B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
 - 1. Inspections and Approvals:
 - a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
 - b. Verify approval of submittals required by Contract Documents; periodic.

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2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
 3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
 4. Joints and Accessories: When masonry construction begins, verify:
 - a. Proportions of site prepared mortar; periodic.
 - b. Construction of mortar joints; periodic.
 - c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
 5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
 - a. Size and location of structural elements; periodic.
 - b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
 - c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
 - d. Welding of reinforcing bars; continuous.
 6. Grouting Preparation: Prior to grouting, verify:
 - a. Grout space is clean; periodic.
 - b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
 - c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
 - d. Correctly constructed mortar joints; periodic.
 7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.
- C. Engineered Masonry in Buildings Designated as "Essential Facilities": Verify compliance of each item below with approved Contract Documents and the applicable articles of TMS 402/602.
1. Inspections and Approvals:
 - a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
 - b. Verify approval of submittals required by Contract Documents; periodic.
 2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction and upon completion of each 5,000 square feet (464.5 sq m) increment of masonry erected during construction; periodic.
 3. Preblended Mortar and Grout: Verify proportions of materials upon delivery to site; periodic.
 4. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
 5. Engineered Elements, Joints, Anchors, Grouting, Protection: Verify compliance of each item below with approved Contract Documents and referenced standards.
 - a. Proportions of site prepared mortar; periodic.
 - b. Placement of masonry units and construction of mortar joints; periodic.
 - c. Placement of reinforcement, connectors, prestressing tendons, anchorages, etc.; periodic.
 - d. Size and location of structural elements; periodic.
 - e. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; continuous.
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- f. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
- g. Welding of reinforcing bars; continuous.
- 6. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; continuous.

3.05 SPECIAL INSPECTIONS FOR PREFABRICATED AND SITE-BUILT WOOD CONSTRUCTION

- A. High Load Diaphragms: Verify compliance of each item below with approved Contract Documents.
 - 1. Grade and thickness of sheathing.
 - 2. Nominal size of framing members at adjacent panel edges.
 - 3. Nail or staple diameter and length.
 - 4. Number of fastener lines.
 - 5. Fastener spacing at lines and at edges.
- B. Metal Plate Connected Wood Trusses with Clear Span of 60 feet (18.3 m) or More: Verify compliance of each item below with approved Contract Documents in general and with approved truss submittal package in particular.
 - 1. Temporary restraint and bracing.
 - 2. Permanent individual truss member restraint and bracing.

3.06 SPECIAL INSPECTIONS FOR SOILS

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
 - 1. Design bearing capacity of material below shallow foundations; periodic.
 - 2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
 - 3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
 - 4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.
- B. Testing: Classify and test excavated material; periodic.

3.07 SPECIAL INSPECTIONS FOR DRIVEN DEEP FOUNDATIONS

- A. Materials, Equipment and Final Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
 - 1. Material types, sizes and lengths; continuous.
 - 2. Capacities of test elements and additional load tests as required; continuous.
 - 3. Placement locations and plumbness; continuous.
 - 4. Type and size of hammer; continuous.
- B. Installation: Observe driving operations and maintain complete and accurate records for each element; continuous.
 - 1. Record number of blows per foot of penetration.
 - 2. Determine penetration required to achieve design capacity.
 - 3. Record tip and butt elevations.
 - 4. Document any damage to foundation element.
- C. Steel Components of Driven Deep Foundations: Perform additional inspections as required by the Special Inspections for Steel Construction article of this section.
- D. Concrete and Concrete Filled Components of Driven Deep Foundations: Perform additional inspections as required by the Special Inspections for Concrete Construction article of this section.

3.08 SPECIAL INSPECTIONS FOR CAST-IN-PLACE DEEP FOUNDATIONS

- A. Materials, Equipment and Final Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
 - 1. Element length; continuous.
 - 2. Element diameters and bell diameters; continuous.
 - 3. Embedment into bedrock; continuous.
 - 4. End bearing strata capacity; continuous.
 - 5. Placement locations and plumbness; continuous.
 - 6. Type and size of hammer; continuous.
- B. Drilling Operations: Observe and maintain complete and accurate records for each element; continuous.
- C. Material Volume: Record concrete and grout volumes.
- D. Concrete Elements Associated with Cast-in-Place Deep Foundations: Perform additional inspections as required by the Special Inspections for Concrete Construction article of this section.

3.09 SPECIAL INSPECTIONS FOR HELICAL PILE FOUNDATIONS

- A. Materials, Equipment and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
 - 1. Type and capacity of installation equipment used; continuous.
 - 2. Pile dimensions; continuous.
 - 3. Tip elevation; continuous.
 - 4. Final depth; continuous.
 - 5. Final installation torque; continuous.
 - 6. Other installation data requested in writing by Architect; continuous.

3.10 SPECIAL INSPECTIONS FOR VERTICAL MASONRY FOUNDATION ELEMENTS

- A. Vertical Masonry Foundation Elements are subject to the same special inspection requirements listed in the "Special Inspections for Masonry Construction" Article of this section.

3.11 SPECIAL INSPECTIONS FOR SPRAYED FIRE RESISTANT MATERIALS

- A. Sprayed Fire Resistant Materials, General:
 - 1. Verify compliance of sprayed-fire resistant materials with specific fire-rated assemblies indicated in approved Contract Documents, and with applicable requirements of the building code.
 - 2. Perform special inspections after rough installation of electrical, mechanical, plumbing, automatic fire sprinkler and suspension systems for ceilings.
- B. Physical and visual tests: Verify compliance with fire resistance rating.
 - 1. Condition of substrates; periodic.
 - 2. Thickness of sprayed fire resistant material; periodic.
 - 3. Density of sprayed fire resistant material in pounds per cubic foot (kg per sq m); periodic.
 - 4. Bond strength (adhesion and cohesion); periodic.
 - 5. Condition of finished application; periodic.
- C. Structural member surface conditions:
 - 1. Inspect structural member surfaces before application of sprayed fire resistant materials; periodic.
 - 2. Verify preparation of structural member surfaces complies with approved Contract Documents and manufacturer's written instructions; periodic.

-
- D. Application:
 - 1. Ensure minimum ambient temperature before and after application complies with the manufacturer's written instructions; periodic.
 - 2. Verify area where sprayed fire resistant material is applied is ventilated as required by the manufacturer's written instructions during and after application; periodic.
 - E. Thickness: Verify that no more than 10 percent of thickness measurements taken from sprayed fire resistant material are less than thickness required by fire resistance design in approved Contract Documents. In no case shall the thickness of the sprayed fire resistant material be less than the minimum below.
 - 1. Minimum Allowable Thickness: Tested according to ASTM E605/E605M, periodic.
 - a. Design thickness 1 inch (25 mm) or greater: Design thickness minus 1/4 inch (6.4 mm).
 - b. Design thickness greater than 1 inch (25 mm): Design thickness minus 25 percent.
 - F. Density: Verify density of sprayed fire resistant material is no less than density required by the fire resistance design in the approved Contract Documents.
 - G. Bond Strength: Verify adhesive and cohesive bond strength of sprayed fire resistant materials is no less than 150 pounds per square foot (7.18 kPa) when in-place samples of the cured material are tested according to ASTM E736/E736M and as described below.

3.12 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

- A. Structural Steel: Comply with the quality assurance plan requirements of AISC 341.
- B. Structural Wood:
 - 1. Field gluing; continuous.
 - 2. Nailing, bolting, anchoring and other fastening of components within the seismic force-resisting system; periodic.
- C. Cold Formed Steel Light Frame Construction:
 - 1. Field welding; periodic.
 - 2. Screw attachment, bolting, anchoring and other fastening of components within the main seismic force-resisting system; periodic.
- D. Designated Seismic System Verification: Verify label, anchorage or mounting complies with certificate of compliance provided by manufacturer or fabricator.
- E. Structural Testing for Seismic Resistance:
 - 1. Concrete reinforcement: Comply with ACI CODE-318, Section 21.1.5.2.
 - a. Materials Obtain mill certificates demonstrating compliance with ASTM A615/A615M; periodic.
 - b. Welding: Perform chemical tests complying with ACI CODE-318, Section 3.5.2 to determine weldability; periodic.
 - 2. Structural Steel: Comply with the quality assurance requirements of AISC 341.
- F. Structural Observations for Seismic Resistance: Visually observe structural system for general compliance with the approved Contract Documents; periodic.

3.13 SPECIAL INSPECTIONS FOR WIND RESISTANCE

3.14 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.

-
2. Perform specified sampling and testing of products in accordance with specified reference standards.
 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
 5. Perform additional tests and inspections required by Architect.
 6. Submit reports of all tests or inspections specified.
- B. Limits on Special Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the work.
- C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.15 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 2. Perform specified sampling and testing of products in accordance with specified standards.
 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
 5. Perform additional tests and inspections required by Architect.
 6. Submit reports of all tests or inspections specified.
- B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the work.
- C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.
- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.16 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
 2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.

-
- b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or inspections.
 - d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- B. Contractor Responsibilities, Seismic Force-Resisting System, Designated Seismic System, and Seismic Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.
- C. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 015813 - Temporary Project Signage.

1.03 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. Existing facilities may be used as outlined in the pre-bid conference.

1.04 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 SECURITY

- A. Coordinate with Owner's security program as outlined in the pre-bid conference.
- B. Key personnel with Contractor and Subcontractors shall register with the Owner's security to effectively perform work as escort workers not registered with the Owner's security program.
- C. The Contractor is responsible for conduct of all workers and subcontractors while on cam

1.06 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Designated existing on-site roads may be used for construction traffic.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.07 WASTE REMOVAL

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.08 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

**SECTION 016000
PRODUCT REQUIREMENTS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Procedures for Owner-supplied products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Instructions To Bidders, and Supplementary Instructions To Bidders: Additional information and requirements concerning Substitutions.
- B. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- C. Section 014000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 15 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 - PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Made of wood from newly cut old growth timber.
- C. Where other criteria are met, Contractor shall give preference to products that:
 - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 2. Have longer documented life span under normal use.
 - 3. Result in less construction waste. See Section 017419
 - 4. Are made of vegetable materials that are rapidly renewable.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 012500 - Substitution Procedures.
- B. Acceptance of suppliers, manufacturers, and/or products shall be limited to those named, unless others are properly submitted during bidding in accordance with substitution procedures, and subsequently accepted.
- C. Instructions to Bidders specifies time restrictions and procedures for submitting requests for substitutions during the bidding period. These time restrictions and procedures are superceded by any modifications found in Supplementary Instructions to Bidders (or Additions to Instructions to Bidders).
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
 - 1. Submittals during construction other than those pre-qualified or pre-accepted will not be reviewed, but instead returned for re-submittal, without exception.
- E. Substitution Submittal Procedure. A proper pre-bid submittal for "pre-qualified" or "pre-accepted" consideration and review, shall be one which includes at least the following:
 - 1. Submit request for substitution for consideration. Limit each request to one proposed substitution.
 - a. Use Substitution Request form attached at end of this Section.
 - 2. Submit with cover letter which outlines the purpose of the submittal, Architect's specifications which apply, and each variation from the original specification.
 - 3. Submit product data (all current and relevant manufacturer's published data), certified test results attesting to the proposed product equivalence, and additional information as required so that a review can be quickly made by comparing the submittal item for item to the original specification. Include samples and other data as requested for the original item. Burden of proof is on proposer.
 - 4. Substitution requests shall be submitted through a qualified General Contractor bidding the project.
- F. After receipt of bids and execution of the Construction Contract, the Owner and the Architect will consider substitutions only under the following conditions:
 - 1. Unavailability of materials if beyond the control of the Contractor and submitted proof that firm orders for the material were placed within ten (10) days after approval of the Subcontractors and Material Suppliers Lists.

2. Other unavailability will be considered only as being due to strikes, lockouts, bankruptcy, or discontinuance of manufacture.
3. Any approved substitutions shall be incorporated into the Contract by Change Order.

3.02 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 2. Arrange and pay for product delivery to site.
 3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
 1. Review Owner reviewed shop drawings, product data, and samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.
- 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

SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____
Attn: _____ A/E Project No.: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page and Paragraph: _____

Proposed Substitution: _____
Trade Name: _____
Manufacturer: _____ Model No.: _____
Mfg. Address _____ City, State, zip: _____ Phone: _____

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

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

The Undersigned certifies:

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

Submitted by: _____
Signed by: _____
Firm: _____
Address: _____

Telephone: _____ E-mail: _____

A/E's REVIEW AND ACTION

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

Signed by: _____

Date: _____

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

**SECTION 017000
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. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- G. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- B. Section 014000 - Quality Requirements: Testing and inspection procedures.
- C. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- D. Individual Product Specification Sections:
 - 1. Advance notification to other sections of openings required in work of those sections.
 - 2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
 - 6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.

- e. Alternatives to cutting and patching.
- f. Effect on work of Owner or separate Contractor.
- g. Written permission of affected separate Contractor.
- h. Date and time work will be executed.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

- A. For survey work, employ a Professional Land Surveyor licensed in the State in which the Project is located and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.
- C. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
 - 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

-
- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
 - 1. Contractor shall schedule ordering of products, taking lead-times into account, and shall be responsible for any cost associated with expediting delivery of specified items in order to keep project on schedule.
 - B. Notify affected utility companies and comply with their requirements.
 - C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
 - F. Coordinate completion and clean-up of work of separate sections.
 - G. After Owner-occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
 - 1. Every trade shall examine substrate to determine if it is adequate to receive the work of that section prior to initiating work.
 - 2. Notify Contractor of any deficiencies needing correction.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work,

assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 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. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- G. Utilize Standards of Practice for Professional Land Surveyors.
- H. 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.
- I. Periodically verify layouts by same means.
- J. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- C. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
 - 3. Relocate items indicated on drawings.
 - 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 - 4. Verify that abandoned services serve only abandoned facilities.
 - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.

-
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 - 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
 - G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
 - H. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
 - I. Clean existing systems and equipment.
 - J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
 - K. Do not begin new construction in alterations areas before demolition is complete.
 - L. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- D. 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.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

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- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.
 - J. Patching:
 - 1. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
 - 2. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 3. Match color, texture, and appearance.
 - 4. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See appropriate Division 23 Section.

3.11 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are nonhazardous.

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- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
 - D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
 - E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
 - F. Replace filters of operating equipment.
 - G. Clean 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.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect.
- B. The Contractor shall generate and provide a punch-list to the Architect prior to requesting inspection for substantial completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Accompany Architect on Contractor's preliminary final inspection.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.13 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

**SECTION 017800
CLOSEOUT SUBMITTALS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment. All record documents, warranties and O&M manuals are to be submitted in paper format (1 copy) along with 3 copies of USB Drives of PDF's of the documents.
- B. At completion of Project, the Contractor shall submit to Architect a complete set of clearly marked-up Project Documents, as follows:
 - 1. One (1) Original Set clearly marked as-built, record drawings and specifications.
 - 2. Three (3) copies of USB Drives: Each with as-built record drawings and as-built record specifications along with O&M Manuals and Warranties.
- C. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit one paper set and three USB Drives of revised final documents in final form within 10 days after final inspection, each with as-built record drawings and as-built record specifications along with O&M Manuals and Warranties as referenced above.
- D. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
 - 4. Submit CD's with PDF's of as-built record drawings and as-built record specifications along with O&M Manuals and Warranties as referenced above.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record 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.
- G. Scan marked-up Record Drawings and Specifications onto three (3) USB Drives (each with as-built record drawings and as-built record specifications).

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.

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- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
 - C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
 - D. Additional information as specified in individual product specification sections.
 - E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
 - F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- O. Include test and balancing reports.
- P. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
- N. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

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- O. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

**SECTION 017900
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. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Finishes, including flooring, wall finishes, ceiling finishes.
 - 2. Fixtures and fittings.
 - 3. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.
- B. Section 019113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.
- C. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Owner.
 - 2. Submit to Commissioning Authority for review and inclusion in overall training plan.
 - 3. Submit not less than four weeks prior to start of training.
 - 4. Revise and resubmit until acceptable.
 - 5. Provide an overall schedule showing all training sessions.
 - 6. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such a slides, hand-outs, etc.

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- h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
 - C. 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.
 - D. 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.
 - E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
 - 1. Format: Owner's preference.
 - 2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. 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. Perform demonstrations not less than two weeks prior to Substantial Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

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- B. Conduct training on-site unless otherwise indicated.
 - C. Owner will provide classroom and seating at no cost to Contractor.
 - D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
 - E. Provide training in minimum two hour segments.
 - F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.
 - G. 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.
 - H. 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.
 - I. 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.
 - J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
1. Footings
 2. Foundation walls
 3. Slabs-on-grade
 4. Suspended slabs
 5. Topping slabs
 6. Building frame members
 7. Building walls
- B. Related Sections include the following:
1. Section 02300 "Earth Work" for drainage fill under slabs-on-grade.
 2. Section 02751 for concrete pavement and walks.
 3. Division 5 for metals.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- A. Shop Drawings, General:
1. Submit all shop drawings on one reproducible print and two copies only. The reproducible print will be returned. All other reproductions required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.
 2. The contractor shall fill out the Concrete Submittal Checklist and include it as part of his mix design and/or shop drawing submittal package(s). Submittals without the checklist will be returned unchecked as an incomplete submittal. The checklist sheet is located at the end of this specification section.

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- a. If there are questions, clarifications, modifications, or other items where information, a response, or approval is requested, such items must be written on the checklist. Only indicating such items on the shop drawings or within the calculations is not sufficient. Where items are not specifically listed on the checklist and subsequently not explicitly approved by the Structural Engineer of Record, such items are not to be considered approved or considered.
 3. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.
 4. Contract documents shall not be used for shop drawing, including erection plans or details.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: Prepare design mixes for each type and strength of concrete by either laboratory trial mixtures or field experience methods as specified in ACI 318-05 Section 5.3. If trial mixtures method used, the contractor is to provide and use an independent testing facility for preparing and reporting proposed mix designs.
1. All concrete mix designs shall include the following information:
 - a. Proportions of cement, fine and coarse aggregate and water.
 - b. Water/cement ratio, design strength, slump and air content.
 - c. Type of cement and aggregates.
 - d. Type and dosage of all admixtures.
 - e. Type, color and dosage of integral coloring compounds, where applicable.
 - f. Special requirements for pumping.
 - g. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified.
 - h. Dated test data for the laboratory trial mixture or filed experience method.
 - i. Material certifications (materials shall meet the requirements of section 2.5 below)
 - 1) Cementitious materials.
 - 2) Admixtures.
 - 3) Aggregates
 2. Submit written reports to Architect and Structural Engineer of Record of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed and approved by Architect and Structural Engineer of Record.
- D. Contract documents shall not be used for shop drawing, including erection plans or details.
- E. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- F. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
1. Shop drawings for formwork, prepared for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.

- a. Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.
- G. Samples: Submit samples of materials as requested by Architect, including names, sources, and descriptions for waterstops, vapor retarder and other products indicated by Architect.
- H. Welding certificates.
- I. Qualification Data: For Installer, manufacturer and testing agency.
- J. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- K. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Fiber reinforcement.
 - 6. Waterstops.
 - 7. Curing compounds.
 - 8. Floor and slab treatments.
 - 9. Bonding agents.
 - 10. Adhesives.
 - 11. Vapor retarders.
 - 12. Semirigid joint filler.
 - 13. Joint-filler strips.
 - 14. Repair materials.
- L. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- M. Field quality-control test and inspection reports.
- N. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. The Owner shall employ an approved Testing Agency to perform concrete and concrete related tests and inspections (that are not specifically noted as the contractor's responsibility) as required by the Building Code, Project Documents, the Architect, and the Structural Engineer of Record.
- E. The contractor shall employ at his expense an approved Testing Agency as defined above to perform the following:
1. Evaluation of trial mixtures and/or concrete testing for mix design submission.
 2. Qualification of proposed materials and establishment of concrete mixtures.
 3. Other testing services needed or required by the contractor.
- F. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
- G. Testing Responsibilities of the Contactor:
1. Submit data on qualifications of Contractor's proposed testing agency. Use of testing services will not relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
 2. Furnish any labor necessary to assist Owner's testing agency in obtaining and handling samples at the project site or at the source of materials.
 3. Advise Owners Testing Agency at least 24 hours in advance of operations to allow for completion of quality tests and assignment of personnel.
 4. At the Contractor's expense, provide and maintain for the sole use of the Owner's Testing agency adequate facilities for the safe storage and proper curing of concrete test specimens on the project site for initial curing as required by ASTM C31.
- H. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- I. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code-Reinforcing Steel."
- J. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 3. ACI 302 "Guide for Concrete Floor and Slab Construction".
 4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
 5. ACI 305 "Hot Weather Concreting".
 6. ACI 306 "Cold Weather Concreting".
 7. ACI 309 "Guide for Consolidation of Concrete".
 8. ACI 347 "Recommended Practice for Concrete Formwork".
 9. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- K. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.
- L. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces, and adhesion of membranes to concrete.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) ASTM A 706/A 706M, deformed bars, ASTM A 767/A 767M, Class I zinc coated after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) ASTM A 706/A 706M, deformed bars, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.
- D. Plain-Steel Wire: ASTM A 82, as drawn.
- E. Deformed-Steel Wire: ASTM A 496.
- F. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- G. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

- A. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- B. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 - 3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I, gray or white. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or F.

- 1) Limit use of fly ash to not exceed 25 percent of cementitious content by weight.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 1) Limit use of Ground Granulated Blast-Furnace Slag to not exceed 50 percent of cementitious content by weight.
 2. Blended Hydraulic Cement: ASTM C 595, Type [IS, portland blast-furnace slag] [IP, portland-pozzolan] [I (PM), pozzolan-modified portland] [I (SM), slag-modified portland] cement.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride. Use of admixture must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C. Set-Accelerating Corrosion-Inhibiting Admixtures must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal.
1. Available Products:
 - a. Boral Material Technologies, Inc.; Boral BCN.
 - b. Euclid Chemical Company (The); Eucon CIA.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI.

- d. Master Builders, Inc.; Rheocrete CNI.
 - e. Sika Corporation; Sika CNI.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete. Non-Set-Accelerating Corrosion-Inhibiting Admixture must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal.
- 1. Available Products:
 - a. Axim Concrete Technologies; Catexol 1000CI.
 - b. Boral Material Technologies, Inc.; Boral BCN2.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
 - d. Master Builders, Inc.; Rheocrete 222+.
 - e. Sika Corporation; FerroGard-901.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis. See architectural drawings and site plan for concrete requiring color pigment.
- 1. Available Manufacturers:
 - a. Bayer Corporation.
 - b. ChemMasters.
 - c. Conspec Marketing & Manufacturing Co., Inc.; a Dayton Superior Company.
 - d. Davis Colors.
 - e. Elementis Pigments, Inc.
 - f. Hoover Color Corporation.
 - g. Lambert Corporation.
 - h. Scofield, L. M. Company.
 - i. Solomon Colors.
 - 2. Color: As selected by Architect from manufacturer's full range.

2.7 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
- 1. Available Manufacturers:
 - a. Bometals, Inc.
 - b. Greenstreak.
 - c. Meadows, W. R., Inc.
 - d. Tamms Industries, Inc.
 - e. Vinylex Corp.
 - 2. Profile: As indicated.
 - 3. Dimensions: As indicated; nontapered.

2.8 VAPOR RETARDERS

- A. Underslab Vapor Barrier 1: 15 mil minimum thickness, Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced, high density polyethylene, or polyolefin equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
 - 1. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.
 - 2. Basis of Design Product:
 - a. STEGO INDUSTRIES LLC Product Stego Wrap (15-mil) Vapor Barrier ; www.stegoindustries.com
 - 3. Other Acceptable products
 - a. Fortifiber Building Systems Group Product Moistop Ultra® 15; www.fortifiber.com.
 - b. Reef Industries Product Griffolyn 15 Mil ; www.reefindustries.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.9 FLOOR AND SLAB TREATMENTS

- A. General: The contractor shall coordinate and insure that all floor and slab treatments, curing materials and compounds, finish floor materials, related materials, paints, and repair compounds are compatible.
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces. To be applied where concrete indicated to be sealed in Architectural Drawings.
 - 1. Available Products:
 - a. Burke by Edoco; Titan Hard.
 - b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
 - c. Dayton Superior Corporation; Day-Chem Sure Hard.
 - d. Euclid Chemical Company (The); Euco Diamond Hard.
 - e. L&M Construction Chemicals, Inc.; Seal Hard.
 - f. Meadows, W. R., Inc.; Liqui-Hard.
 - g. Nox-Crete Products Group, Kinsman Corporation; Duranox.
- C. For additional information on color stained concrete see 03032 Color Stained concrete specifications.

2.10 CURING MATERIALS

- A. General: The contractor shall coordinate and insure that all floor and slab treatments, curing materials and compounds, finish floor materials, related materials, paints, and repair compounds are compatible. Evaporation retarder shall not be used where epoxy floor covering is to be placed; slab shall be wet cured with Absorptive Cover or Moisture-Retaining Cover as indicated below.
1. The contractor shall verify and be responsible for insuring the VOC emission limits of authorities having jurisdiction are not exceeded during the project.
- B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Available Products:
 - a. Burke by Edoco; BurkeFilm.
 - b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - c. Dayton Superior Corporation; Sure Film.
 - d. Euclid Chemical Company (The); Eucobar.
 - e. L&M Construction Chemicals, Inc.; E-Con.
 - f. Meadows, W. R., Inc.; Sealtight Evapre.
 - g. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
 - h. Sika Corporation, Inc.; SikaFilm.
- C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet or natural fiber matting attached to plastic sheet backing. Acceptable product is Aquacure by DRC, exclusive distributor - Greenstreak Group, Inc. 800-325-9504, or equal.
- E. Water: Potable.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Review curing compounds with manufacturer and waterproofing manufacturer to make sure curing compound does not inhibit adhesion.
1. Available Products:
 - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
 - b. Burke by Edoco; Aqua Resin Cure.
 - c. ChemMasters; Safe-Cure Clear.
 - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
 - e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
 - f. Euclid Chemical Company (The); Kurez DR VOX.
 - g. Kaufman Products, Inc.; Thinfilm 420.
 - h. Lambert Corporation; Aqua Kure-Clear.
 - i. L&M Construction Chemicals, Inc.; L&M Cure R.
 - j. Meadows, W. R., Inc.; 1100 Clear.
 - k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.

- I. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.
 - m. Tamms Industries, Inc.; Horncure WB 30.
 - n. Unitex; Hydro Cure 309.
 - o. US Mix Products Company; US Spec Maxcure Resin Clear.
 - p. Vexcon Chemicals, Inc.; Certi-Vex Envicure 100.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 - 1. Available Products:
 - a. Anti-Hydro International, Inc.; AH Clear Cure WB.
 - b. Burke by Edoco; Spartan Cote WB II.
 - c. ChemMasters; Safe-Cure & Seal 20.
 - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Cure and Seal WB.
 - e. Dayton Superior Corporation; Safe Cure and Seal (J-18).
 - f. Euclid Chemical Company (The); Aqua Cure VOX.
 - g. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
 - h. Lambert Corporation; Glazecote Sealer-20.
 - i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - j. Meadows, W. R., Inc.; Vocomp-20.
 - k. Metalcrete Industries; Metcure.
 - l. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 150E.
 - m. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
 - n. Tamms Industries, Inc.; Clearseal WB 150.
 - o. Unitex; Hydro Seal.
 - p. US Mix Products Company; US Spec Hydrasheen 15 percent
 - q. Vexcon Chemicals, Inc.; Starseal 309.
- H. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 - 1. Available Products:
 - a. Burke by Edoco; Spartan Cote WB II 20 Percent.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
 - d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
 - e. Euclid Chemical Company (The); Diamond Clear VOX.
 - f. Kaufman Products, Inc.; SureCure Emulsion.
 - g. Lambert Corporation; Glazecote Sealer-20.
 - h. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - i. MBT Protection and Repair, Div. of ChemRex; MasterKure-N-Seal VOC.
 - j. Meadows, W. R., Inc.; Vocomp-20.
 - k. Metalcrete Industries; Metcure 0800.
 - l. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 200E.
 - m. Sonneborn, Div. of ChemRex; Kure-N-Seal.
 - n. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.

- o. Tamms Industries, Inc.; Clearseal WB STD.
 - p. Unitex; Hydro Seal 18.
 - q. US Mix Products Company; US Spec Radiance UV-25
 - r. Vexcon Chemicals, Inc.; Starseal 0800.

- I. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. Available Products:
 - a. Burke by Edoco; Cureseal 1315.
 - b. ChemMasters; Spray-Cure & Seal Plus.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315.
 - d. Dayton Superior Corporation; Day-Chem Cure and Seal (J-22UV).
 - e. Euclid Chemical Company (The); Super Diamond Clear.
 - f. Kaufman Products, Inc.; Sure Cure 25.
 - g. Lambert Corporation; UV Super Seal.
 - h. L&M Construction Chemicals, Inc.; Lumiseal Plus.
 - i. Meadows, W. R., Inc.; CS-309/30.
 - j. Metalcrete Industries; Seal N Kure 0.
 - k. Sonneborn, Div. of ChemRex; Kure-N-Seal 5.
 - l. Tamms Industries, Inc.; LusterSeal 300.
 - m. Unitex; Solvent Seal 1315.
 - n. US Mix Products Company; US Spec CS-25
 - o. Vexcon Chemicals, Inc.; Certi-Vex AC 1315

- J. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. Available Products:
 - a. Burke by Edoco; Cureseal 1315 WB.
 - b. ChemMasters; Polyseal WB.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.
 - d. Euclid Chemical Company (The); Super Diamond Clear VOX.
 - e. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
 - f. Lambert Corporation; UV Safe Seal.
 - g. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
 - h. Meadows, W. R., Inc.; Vocomp-30.
 - i. Metalcrete Industries; Metcure 30.
 - j. Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.
 - k. Tamms Industries, Inc.; LusterSeal WB 300.
 - l. Unitex; Hydro Seal 25.
 - m. US Mix Products Company; US Spec Radiance UV-25.
 - n. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

- K. For additional information on finishing and sealing floor surfaces to receive color stained concrete see COLOR STAINED CONCRETE - RESURFACING - SECTION 03032

2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 typically unless noted or aromatic polyurea at traffic areas with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.13 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Concrete type, slump, air content, and maximum water to cementitious content shall be as shown on the Structural Drawings.
- C. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 - 5. Silica Fume: 10 percent.
 - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use of admixture must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal
 - 2. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 3. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 4. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 5. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- F. Slump Limits: Proportion and design mixes to result in slump at point of placement as shown on the drawings.
 - 1. When use of a Type I or II plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C494 is permitted, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

- G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Building Members: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: As indicated in drawings.
 2. Maximum Water-Cementitious Materials Ratio: As indicated in drawings.
 3. Slump Limit: As indicated in drawings. 8 inches (200 mm), plus or minus 1 inch (25 mm), for concrete with verified slump indicated in drawings before adding high-range water-reducing admixture or plasticizing admixture].
 4. Air Content: As indicated in drawings, at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

2.15 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. Mixing and delivery time shall not exceed 90 minutes.
 2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 - 2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 REMOVING AND REUSING FORMS

- A. General: 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 (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Convene preconstruction meeting prior to starting work. Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" and Structural Drawings for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.
- G. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized steel wire ties to fasten zinc-coated steel reinforcement.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls no further than 90' on center. Locate joints midway between piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 3. Slab reinforcement shall not cross contraction joints.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.7 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with the recommendations and intent of ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301. Deliver concrete to meet the following minimum temperatures immediately after placement:
 - a. 55 deg F for sections less than 12in. in the least dimension.
 - b. 50 deg F for sections 12in. to 36in. in the least dimension.
 - c. 45 deg F for sections 36in. to 72in. in the least dimension.
 - d. 40 deg F for sections greater than 72in. in the least dimension.
 - e. The temperature of concrete as placed shall not exceed these values by more than 20 deg F.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with the recommendations and intent of ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

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- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
1. Apply scratch finish to surfaces indicated by Architect and to receive concrete floor toppings, to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated by Architect to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated by Architect, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 3. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated by Architect, where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate or aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate or aluminum granules over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
 2. After broadcasting and tamping, apply float finish.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate or aluminum granules.
- H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations and intent of ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions to concrete floors indicated in Architectural Drawings to be troweled and sealed.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than seven days' old unless otherwise required by manufacturer.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 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 a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of use of required design mixture.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days. Compression test specimens for days not specified shall be at the contractors expense.

- b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Structural Engineer of Record but will not be used as sole basis for approval or rejection of concrete.
 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete at the Contractor's expense when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Structural Engineer of Record. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

CONCRETE SUBMITTAL CHECKLIST

This submittal checklist must be provided with all concrete and reinforcing steel packages that are to be submitted to Structural Design Group. Absence of a properly completed checklist may result in the return of the submittal unchecked or as revise and resubmit.

MIX DESIGN		
Included?	Description	Location in project documentation where this requirement is located.
<input type="checkbox"/>	Field data or trial mixture strength data	Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Verify Mix Design Constraints Limit Fly Ash to 25% Limit Proportions per Spec Section 03300, Part II, Subsection 2.5 W/C ratio, Air, Slump per General Notes	Spec Section 03300, Part II, Subsection 2.5 General Notes – Section 4.0
<input type="checkbox"/>	Mix Design Data: 1. Proportions of cement, fine and coarse aggregate and water. 2. Water/cement ratio, design strength, slump and air content. 3. Type of cement and aggregates. 4. Type and dosage of all admixtures. 5. Type, color and dosage of integral coloring compounds, where applicable. 6. Special requirements for pumping. 7. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified. 8. Material certifications 1) Cementitious materials. 2) Admixtures. 3) Aggregates .	Spec Section 03300, Part I, Subsection 1.4 Spec Section 03300, Part I, Subsection 2.5, 2.6
REBAR SHOP DRAWINGS		
Included?	Description	Location in project documentation where this requirement is located.
<input type="checkbox"/>	Submit all shop drawings on one reproducible print and two reproductions only.	General Notes - Section 2.0 Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Contract documents not used for shop drawing.	Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Resubmitted shop drawings have all revised items clouded or identified.	Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Any requested information, clarifications, requests for approvals, modifications, etc. as listed in Spec Section 03300, Part I, Subsection 1.4 are included by the contractor below.	Spec Section 03300, Part I, Subsection 1.4

FORMWORK, RE-SHORE, OTHER SHOP DRAWINGS		
Included?	Description	Location in project documentation where this requirement is located.
<input type="checkbox"/>	Submit all shop drawings on one reproducible print and two reproductions only.	General Notes - Section 2.0 Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Contract documents not used for shop drawing, including erection plans or details	Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Resubmitted shop drawings have all revised items clouded or identified.	Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Any requested information, clarifications, requests for approvals, modifications, etc. as listed in Spec Section 03300, Part I, Subsection 1.4 are included by the contractor below.	Spec Section 03300, Part I, Subsection 1.4
<input type="checkbox"/>	Calculations stamped by an Engineer registered in the state where the project is located.	Spec Section 03300, Part I, Subsection 1.4
QUESTIONS, ETC. PER SECTION 03300, PART I, SUBSECTION 1.4		

END OF SECTION 03300

**SECTION 053100
STEEL DECK**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including general and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:

1. Roof deck.

- B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Division 09 painting Sections for repair painting of primed deck.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Submit all shop drawings on three copies only unless specified otherwise in the general conditions. Two prints will be returned to the architect. All copies required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.

- B. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.

1. Provide test data for mechanical fasteners used fastening deck to supporting structures.

- C. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:

1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
 2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
 3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."
- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
1. Welded decking in place is subject to inspection and testing. General Contractor will bear the expense of removing and replacing portions of decking for testing purposes if welds are found to be unsatisfactory. Remove work found to be defective and replace with new acceptable work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:
1. Bowman Metal Deck Div., Cyclops Corp.
 2. Consolidated Systems, Inc.
 3. Epic Metals Corp.
 4. Marlyn Steel Products, Inc.
 5. H. H. Robertson Co.
 6. Roll Form Products, Inc.
 7. Roof Deck, Inc.
 8. United Steel Deck, Inc.
 9. Vulcraft Div., Nucor Corp.
 10. Wheeling Corrugating Co.

2.2 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.
- D. Galvanizing: ASTM A 525, G60.
- E. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

2.3 PRODUCTS

A. ROOF DECK.

Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade **33**, **G60** zinc coating.
2. Deck Profile: SEE PLAN
3. Profile Depth: SEE PLAN
4. Design Uncoated-Steel Thickness: SEE PLAN
5. Span Condition: Triple Span or MORE
6. Side Laps: Overlapped or interlocking seam at contractor's option

2.4 ACCESSORIES:

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- C. Mechanical Fasteners: Corrosion-resistant self-drilling, self-threading screws.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- H. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.
- I. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members AS INDICATED IN DRAWINGS:
 - 1. Anchor Diameter: SEE PLAN.
 - 2. Anchor Spacing: SEE PLAN
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps as noted on drawings. Fasten perimeter edges of at intervals not exceeding 12" and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws as indicated on drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches with end joints as follows:
 1. End Joints: Lapped 2 inches minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.
 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 1. Weld Diameter: 5/8 inch, nominal.
 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
 3. Weld Spacing: Space and locate welds as indicated.
 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows:
 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 1. End Joints: Butted.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.
- F. Test all weld studs according to applicable standards.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

STEEL DECK SUBMITTAL CHECKLIST

This submittal checklist must be provided with all steel deck packages that are to be submitted to Structural Design Group. Absence of a properly completed checklist may result in the return of the submittal unchecked or as revise and resubmit.

STEEL DECK SHOP DRAWINGS AND CALCULATIONS		
Included?	Description	Location in project documentation where this requirement is located.
<input type="checkbox"/>	Submit all shop drawings on one reproducible print and two reproductions only.	General Notes - Section 2.0 Spec Section 05310, Part I, Subsection 1.3
<input type="checkbox"/>	Contract documents not used for shop drawing, including erection plans or details	Spec Section 05310, Part I, Subsection 1.3
<input type="checkbox"/>	Resubmitted shop drawings have all revised items clouded or identified.	Spec Section 05310, Part I, Subsection 1.3
<input type="checkbox"/>	Any requested information, clarifications, requests for approvals, modifications, etc. as listed in Spec Section 05310, Part I, Subsection 1.3 are included on the checklist.	Spec Section 05310, Part I, Subsection 1.3
QUESTIONS, ETC. PER SECTION 05310, PART I, SUBSECTION 1.3		

**SECTION 035413.11
GYPSUM CEMENT UNDERLAYMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gypsum cement floor underlayment.
- B. Sound control mat

1.02 REFERENCE STANDARDS

- A. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.
- B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations.
- C. Manufacturer's Instructions: Indicate surface preparation.
- D. Applicator's qualification statement.
- E. Specimen warranty.

1.04 QUALITY ASSURANCE

1.05 DELIVERY, STORAGE, AND HANDLING

- A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Keep dry and protect from direct sun exposure and freezing.

1.06 FIELD CONDITIONS

- A. Maintain minimum ambient temperatures of 50 degrees F (10 degrees C) 24 hours before, during, and 72 hours after installation of underlayment.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty for defective materials. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Cement Underlayment:
 - 1. Maxxon Corporation; Gyp-Crete 2000 Multifamily: www.maxxon.com/#sle.
- B. Sound Control Mat:
 - 1. Maxxon Corporation; Acousti-Mat 1/8: www.maxxon.com/#sle.

2.02 MATERIALS

- A. Gypsum Cement Underlayment: Gypsum-based mix producing the following properties when mixed with water in accordance with manufacturer's directions:
 - 1. Compressive Strength: Minimum 2,500 psi (17.24 MPa) in accordance with ASTM C472.
 - 2. Density: Maximum 115 pcf (1842 kg/cu m).
 - 3. Thickness: 3/4 inch (19.1 mm) to maximum 3 inches (76.2 mm).
 - 4. Surface Burning Characteristics: Flame spread/smoke developed index of 0/0 in accordance with ASTM E84.
- B. Sound Control Mat: Sheet-rolled, styrene butadiene rubber mat, attached to water-resistant nonwoven fabric.
 - 1. Thickness: 1/8 inch (3.2 mm).
- C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- D. Joint and Crack Filler: As recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify substrates are structurally sound and surfaces are clean, dry, and do not contain petroleum byproducts or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. Remove substrate surface irregularities; fill voids and deck joints with filler. Finish smooth and vacuum surfaces.

3.03 INSTALLATION

- A. Mix materials in accordance with manufacturer's instructions.
- B. Install in accordance with manufacturer's written instructions.
- C. Place to indicated thickness, with top surface level to 1/8 inch in 10 feet (1:1000).

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.

3.05 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit foot traffic over unprotected floor surface until installed surfaces are set for 4 hours minimum.

END OF SECTION

**SECTION 042000
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Clay facing brick.
- C. Mortar and grout.
- D. Reinforcement and anchorage.
- E. Flashings.
- F. Lintels.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 031000 - Concrete Forming and Accessories: Dovetail slots for masonry anchors.
- B. Section 032000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- C. Section 033000 - Cast-in-Place Concrete: Installation of dovetail slots for masonry anchors.
- D. Section 044313 - Stone Masonry Veneer: Stone bonded to masonry back-up.
- E. Section 055000 - Metal Fabrications: Loose steel lintels.
- F. Section 061000 - Rough Carpentry: Nailing strips built into masonry.
- G. Section 071113 - Bituminous Dampproofing: Dampproofing parged masonry surfaces.
- H. Section 072500 - Weather Barriers: Water-resistive barriers applied to exterior face of backing sheathing or unit masonry substrate.
- I. Section 076200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- J. Section 079200 - Joint Sealants: Sealing control and expansion joints.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 012100 - Allowances, for quantity allowances affecting this section.

1.04 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2023b.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019 (Reapproved 2025).
- E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- F. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.

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- H. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.
 - I. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
 - J. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.
 - K. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023a.
 - L. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
 - M. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
 - N. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
 - O. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.
 - P. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
 - Q. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
 - R. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
 - S. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
 - T. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
 - U. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
 - V. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.
 - W. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
 - X. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.
 - Y. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).
 - Z. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
 - 1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- E. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- F. Designer's Qualification Statement.
- G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

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.

1.07 MOCK-UPS

- A. Construct a masonry wall as a mock-up panel sized 8 feet (2.4 m) long by 6 feet (1.8 m) high; include mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.
- B. Locate where directed.
- C. Mock-up may not remain as part of work.

1.08 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.

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 (400 by 200 mm) and nominal depth of 8 inches (200 mm). Other sizes where indicated.
 - 2. Special Shapes: Provide nonstandard blocks configured for corners and control joint edges.
 - a. Provide bullnose units for outside corners. First course on the interior masonry walls shall have 90 degree corner to receive rubber base and bullnose remaining courses.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - a. Hollow block, as indicated.
 - b. Manufacturers:
 - 1) The Concrete Products Group; Spec-Brik:
www.concreteproductsgroup.com/#sle.
 - 2) Substitutions: See Section 016000 - Product Requirements.
 - 4. Nonloadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
 - b. Lightweight.

2.02 BRICK UNITS

- A. Manufacturers:
 - 1. Acme Brick; <https://brick.com/>
 - 2. Belden Brick: www.beldenbrick.com/#sle.
 - 3. General Shale Brick: www.generalshale.com/#sle.
 - 4. Substitutions: See section 016000 - Product Requirements.
- B. Facing Brick: ASTM C216, Type FBS Rough, Grade SW.
 - 1. Color and texture: Field Brick: Acme Brick Cloister – Heritage.
 - 2. Color and texture: Soldier and Header Courses: Acme Brick Inverness – Heritage.

3. Nominal size: modular.
4. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type S.
 1. Colored Mortar: Premixed cement as required to match Architect's color sample.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
 1. Not more than 0.60 percent alkali.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Aggregate: ASTM C404.
- F. 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.
 2. Manufacturers:
 - a. Davis Colors, a division of Venator Materials PLC: www.daviscolors.com/#sle.
 - b. Lambert Corporation: www.lambertusa.com/#sle.
 - c. Solomon Colors, Inc: www.solomoncolors.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- G. Water: Clean and potable.
- H. Accelerating Admixture: Nonchloride type for use in cold weather.
- I. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
- J. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
 1. Use only in combination with masonry units manufactured with integral water repellent admixture.
 2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
 3. Meet or exceed performance specified for water repellent admixture used in masonry units.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 1. Blok-Lok Limited: www.blok-lok.com/#sle.
 2. Hohmann & Barnard, Inc; Truss Mighty Lok 170-ML: www.h-b.com/#sle.
 3. WIRE-BOND: www.wirebond.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Reinforcing Steel: Type specified in Section 032000; size as indicated on drawings; galvanized finish.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 1. Type: Truss or ladder.
 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.

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- E. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss, with adjustable ties or tabs spaced at 16 in (406 mm) on center.
 - 2. Size: 0.1875 inch (4.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods and adjustable components of 0.1875 inch (4.8 mm) wire, width of components as required to provide not less than 5/8 inch (16 mm) of mortar coverage from each masonry face.
 - 3. Vertical adjustment: Not more than 1 1/4 inches (32 mm).
 - 4. Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch (3.8 mm) diameter.
 - F. 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 (1.91 mm) 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 (4.75 mm) thick.
 - 3. Vertical adjustment: Not less than 3-1/2 inches (89 mm).

2.05 FLASHINGS

- A. Metal Flashing Materials:
 - 1. Stainless Steel Flashing: ASTM A666/A666M, Type 304, soft temper; 26 gauge, 0.0187 inch (0.48 mm) thick; finish 2B to 2D.
 - 2. Prefabricated Metal Flashing: Smooth fabricated 12 oz/sq ft (3.66 kg/sq m) stainless steel (type 304) flashing for surface mounted conditions.
 - a. Manufacturers:
 - 1) Cheney Flashing Company: www.cheneyflashing.com/#sle.
 - 2) Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - 3) Substitutions: See Section 016000 - Product Requirements.
- B. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; CORNERS & END DAMS - STAINLESS STEEL: www.h-b.com/#sle.
 - b. York Manufacturing, Inc: www.yorkmfg.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
- C. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
 - 1. Manufacturers, Synthetic Rubber Products:
 - a. Mortar Net Solutions; BTL-1 Butyl Sealant: www.mortarnet.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- D. Termination Bars: Stainless steel; compatible with membrane and adhesives.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; T1 - Termination Bar: www.h-b.com/#sle.
 - b. Mortar Net Solutions; Termination Bars: www.mortarnet.com/#sle.
 - c. York Manufacturing, Inc; Termination Bar: www.yorkmfg.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- E. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; DP - DRIP PLATES/EDGES: www.h-b.com/#sle.

- b. Mortar Net Solutions; Metal Drip Edges: www.mortarnet.com/#sle.
 - c. York Manufacturing, Inc: www.yorkmfg.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- F. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.06 ACCESSORIES

- A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
- 1. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com/#sle.
 - b. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - c. WIRE-BOND: www.wirebond.com/#sle.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
- 1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - b. WIRE-BOND: www.wirebond.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
- 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 - a. Manufacturers:
 - 1) Advanced Building Products, Inc; Mortar Break DT: www.advancedbuildingproducts.com/#sle.
 - 2) Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - 3) Mortar Net Solutions; MortarNet: www.mortarnet.com/#sle.
 - 4) York Manufacturing, Inc: www.yorkmfg.com/#sle.
 - 5) Substitutions: See Section 016000 - Product Requirements.
- D. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.
- E. Weeps:
- 1. Type: Polyester mesh.
 - 2. Color(s): As selected by Architect from manufacturer's full range.
 - 3. Manufacturers:
 - a. Advanced Building Products, Inc: www.advancedbuildingproducts.com/#sle.
 - b. Blok-Lok Limited: www.blok-lok.com/#sle.
 - c. Masonry Technology, Inc; Cavity Weep: www.mtidry.com/#sle.
 - d. Mortar Net Solutions; WeepVent: www.mortarnet.com/#sle.
 - e. Substitutions: See Section 016000 - Product Requirements.
- F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 LINTELS

- A. Prefabricated Steel Lintels:
- 1. Manufacturers:
 - a. FEROCORP; FEROCORP Engineered Concealed Lintel Systems: www.ferocorp.com/#sle.
 - b. Hohmann & Barnard, Inc; Engineered Concealed Lintel Systems: www.h-b.com/#sle.

- c. Substitutions: See Section 016000 - Product Requirements.

2.08 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 N.
 - 4. Interior, loadbearing masonry: Type S.
 - 5. 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 required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).
- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- E. 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 (200 mm).
 - 3. Mortar Joints: Concave.
- D. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches (200 mm).
 - 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.07 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches (150 mm).

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches (400 mm) on center vertically and 36 inches (900 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
- B. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at nonmasonry construction.
- B. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
 - 1. Install vertical leg of flashing behind water-resistive barrier sheet over backing.
 - 2. Anchor vertical leg of flashing into backing with a termination bar and sealant.
 - 3. Apply cap bead of sealant on top edge of self-adhered flashing.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Extend metal flashings 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.

3.11 LINTELS

- A. Install loose steel lintels over openings.
- B. Maintain minimum 4 inch (____ mm) bearing on each side of opening.

3.12 GROUTED COMPONENTS

- A. Lap splices minimum 24 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.

3.13 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 (19 mm) wide and deep.

3.14 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation from Alignment of Columns: 1/4 inch (6 mm).
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.
- E. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).
- G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).

3.15 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.

3.16 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.17 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Clean soiled surfaces with cleaning solution.

3.18 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 047200
CAST STONE MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are:
 - 1. Exterior wall units, including sills, water tables, and medallions.

1.02 RELATED REQUIREMENTS

- A. Section 040511 - Masonry Mortaring and Grouting: Mortar for setting cast stone.
- B. Section 042000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- C. Section 079200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2024.
- D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2025.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.
- F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- G. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- J. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
- C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- D. Mortar Color Selection Samples.
- E. Verification Samples: Pieces of actual cast stone components not less than 4 inches (___ mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.
- F. Source Quality Control Test Reports.

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- G. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.05 MOCK-UPS

- A. Provide full size cast stone components for installation in mock-up of exterior wall.
- B. See Section 014000 - Quality Requirements for additional requirements.
- C. Mock-up may not remain as part of the completed work.
- D. Remove mock-up not incorporated into the work and dispose of debris.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Any current producer member of the Architectural Precast Association.
 - 2. Any current producer member of the Cast Stone Institute.
 - 3. Arriscraft; <https://arriscraft.com/> (Basis of Design).
 - 4. RockCast; <https://www.readingrock.com/rockcast>.
 - 5. Substitutions: See Section 016000 - Product Requirements.

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
 - 3. Surface Texture: Medium grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
 - 4. Color: Selected by Architect from manufacturer's full range.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
 - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
 - 2. Unless otherwise indicated on drawings, provide:

- a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.
- 1. Pieces More than 24 inches (610 mm) in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 - 1. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized.
 - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Mortar: Portland cement-lime, as specified in Section 040511 ; do not use masonry cement.
- J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.
- B. Mechanically anchor cast stone units indicated; set remainder in mortar.
- C. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated.
 - 3. Fill vertical joints with mortar.
 - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

- A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.

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1. Rake mortar joints 3/4 inch (19 mm) for pointing.
 2. Remove excess mortar from face of stone before pointing joints.
 3. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
 4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
 - b. Joints in projecting units.
 - c. Joints between rigidly anchored units, including soffits, panels, and column covers.
 - d. Joints below lugged sills and stair treads.
 - e. Joints below ledge and relieving angles.
 - f. Joints labeled "expansion joint".
- B. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
 2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
 3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
 4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).
- B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
- C. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

- A. Keep cast stone components clean as work progresses.

3.06 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

**SECTION 051200
STRUCTURAL STEEL**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. For additional information on exterior steel painting see specification section 09910.

1.2 SUMMARY

- A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
 - 1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
 - 2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
 - 3. Refer to Division 3 for anchor bolt installation in concrete and Division 4 for anchor bolt installation in masonry.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Submit all shop drawings as directed by the architect.
- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards). This data is submitted for information only.
 - 1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 - 2. High-strength bolts (each type), including nuts and washers.
 - a. Include Direct Tension Indicators if used.
 - 3. Structural steel primer paint.
 - 4. Shrinkage-resistant grout.
- C. Shop drawings including complete details and schedules for fabrication and assembly of structural

steel members, procedures, and diagrams.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 5. Contract documents shall not be used for shop drawing, including erection plans or details.
 6. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.
 7. All structural steel connections not specifically detailed on the drawings shall be designed to resist forces indicated, by the Contractor.
 8. For structural-steel connections indicated to comply with design loads, include structural analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.
 9. For each connection, the following shall be noted on the shop drawings:
 - a. Required design reaction
 - b. Calculation sheet number for design
 - c. Capacity of detailed connection
 - d. Stamp of Engineer submitting calculations for the connection
 10. All shop drawings which do not provide this information will be returned unchecked as an incomplete submittal.
- D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges", dated June 10, 1992.
 - a. General: AISC "Code of Standard Practice" shall apply except to the extent that references are made to the responsibility of the Owner and/or Architect or Engineer in which event those references shall have no applicability. Where a conflict exists between the Code of Standard Practice and the Contract Documents, the Contract Documents shall govern.
 2. AISC "Specifications for Structural Steel Buildings," including "Commentary".
 3. AISC "Specifications for Structural Steel Buildings, Section 10, Architecturally Exposed Structural Steel".

4. "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Structural Connections.
 5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
 6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
- B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 2. If re-certification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
- B. Structural Steel: ASTM A992, Grade 50 for wide flange beams; ASTM A36 elsewhere.
- C. Cold-Formed Steel Tubing: ASTM A500, Grade B.
- D. Hot-Formed Steel Tubing: ASTM A501.
- E. Steel Pipe: ASTM A53, Type E or S, Grade B; or ASTM A501.
- F. Moment Connection Material: Unless noted otherwise on the drawings, stiffener plates, doubler plates, gusset plates and the connecting plates shall be the same grade of steel as members being

- connected.
- G. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.
 - H. Anchor Rods: ASTM A307 Grade A, headed type with supplementary requirements S1, unless otherwise indicated.
 - I. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.
 - J. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325.
 - a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B695, Class 50, or hot-dip galvanized complying with ASTM A153.
 - 2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A490.
 - K. Electrodes for Welding: Comply with AWS Code.
 - L. Structural Steel Primer Paint: Red oxide primer.
 - M. Cement Grout: Portland cement (ASTM C150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.
 - N. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. 100 Non-Shrink Grout (Non-Metallic); Conspec, Inc.
 - b. Supreme Grout; Cormix, Inc.
 - c. Sure Grip Grout; Dayton Superior.
 - d. Euco N.S.; Euclid Chemical Co.
 - e. Crystex; L & M Construction Chemicals, Inc.
 - f. Masterflow 713; Master Builders.
 - g. Sealtight 588 Grout; W. R. Meadows.
 - h. Propak; Protex Industries, Inc.
 - i. Set Non-Shrink; Set Products, Inc.
 - j. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
 - 1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 - 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as indicated.
 - 1. Bolt field connections, except where welded connections or other connections are indicated.
 - a. Provide high-strength threaded fasteners for all principal bolted connections, except where unfinished bolts are indicated.
- C. Simple Beam Connections: Standard double angle framed beam connections using bolts as specified.
 - 1. Seated Beam Connections and Stiffened Seated Beam Connections shall not be used unless indicated on the drawings or unless Engineer approval is obtained to verify capacity of supporting member for the resulting eccentricity. The fabricator must verify and bear responsibility that the use of such connections does not interfere with Architectural or MEP requirements.
- D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts."
- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- F. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- G. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- H. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

- A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with slip-critical-type connections.

2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.
- C. Painting of steel exposed to weathering in the finished configuration of the structure:
1. Surface Preparation: Clean surfaces to be painted. Remove rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning.
 2. Prime Coat: Immediately after surface preparation, provide one coat of grey shop applied Organic Zinc Rich Urethane Primer, such as Tnemec 90-97, at 2.5 to 3.5 mils DFT which meets the following performance requirements:
 - a. Solids by Volume: 63%
 - b. Zinc Content: 83% y weight.
 - c. Salt Spray (Fog): ASTM B 117, Scribed Panels, 50,000 hours exposure.
 - d. Adhesion: ASTM 4541 – Type V – no less than 2,083 psi(14.36 MPa) pull.
 - e. Prohesion: ASTM G85 Prohesion Cabinet Testing. 15,000 hours.
 - f. Cathodic Disbondment: ASTM G8, Method A.
 - g. Immersion: ASTM D 870 Potable Water Immersion. 7 year exposure.
 - h. AISC Static Fatigue: Primer shall meet requirements of a Class B surface with a mean slip coefficient no less than 0.50 and a tension creep not in excess of .005 inch over SSPC-SP6 prepared substrate.
 3. Touch Up Primer/Preparation before Finish Coats: Immediately after erection all surfaces shall be cleaned per SSPC – SP1 followed by spot repair preparation of SSPC-SP11 Power tool clean to white metal. Remove all foreign materials and contaminates, clean field welds, bolted connections, and abraded areas of shop paint. All damaged and abraded areas shall have feathered edges. Field touch-up with one coat of Prime Coat, paint applied at 2.5-3.5 Mil DFT prior to finish coat.
 4. Intermediate Coat: Provide one grey finish coat of an Aliphatic Acrylic Polyurethane, such as Tnemec Series 1075 Endura-Shield II, at 3.0 to 5.0 mils DFT which meets the following performance requirements:
 - a. Solids by Volume: 71%
 - b. Salt Spray (Fog): ASTM B 117, 2,000 hours exposure.
 - c. Abrasion: ASTM 4060 (CS-17 Wheel, 1,000 gram load, 1,000 cycles). No more than 139 mg loss.
 - d. Adhesion: ASTM 4541 – no less than 1,423 psi(9.81 MPa) pull.
 - e. Flexibility: ASTM D 522 (Method A) – no less than 14.4% elongation.
 - f. Hardness: ASTM 3363- no gouging with an HB or less pencil.
 - g. Humidity: ASTM 4585- 4,000 hours exposure.
 - h. Impact: ASTM B 2794 – no cracking or delamination of film after 35 inch-pounds direct impact.
 - i. Prohesion: ASTM G85 – 10,000 hours exposure.

5. Finish Coat: Provide one finish coat (color to be selected by architect) of an Advanced Thermoset Solution Fluoropolymer, such as Tnemec Series 1070 Fluoronar, at 2.0 to 3.0 mils DFT which meets the following performance requirements:
 - a. Solids by Volume: 60%
 - b. Salt Spray (Fog): ASTM B 117 – 10,000 hours exposure
 - c. Abrasion: ASTM 4060 – (CS-17 Wheel, 1,000 gram load, 1,000 cycles) no more than 103 mg loss.
 - d. Adhesion: ASTM 4541 – Type V – no less than 1,930 psi(13.3 MPa) pull.
 - e. Flexibility: ASTM D 522 (Method A)- no less than 14.83% elongation.
 - f. Hardness: ASTM 3363 – no gouging with an 8H or less pencil.
 - g. Humidity: ASTM 4585 – 3,000 hours exposure.
 - h. Impact: ASTM B 2794 - no cracking or delamination of film after 35 inch-pounds direct impact.
6. Any Field Painting to be brush or roller applied.
7. Owners testing agent to continuously review the surface preparation and application of the painting of steel exposed to weathering in the finished configuration of the structure.

2.4 SOURCE QUALITY CONTROL

- A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 1. Promptly remove and replace materials or fabricated components that do not comply.
- B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

- A. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when

- permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
 - D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 4. For proprietary grout materials, comply with manufacturer's instructions.
 - E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - F. Level and plumb individual members of structure within specified AISC tolerances.
 - G. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
 - H. Splice members only where indicated and accepted on shop drawings.
 - I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces. Each erection bolt on shop drawings shall be noted "Erection Bolt".
 - 1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
 - J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
 - K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2 QUALITY CONTROL

- A. Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
- B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment.
- E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.
- F. Field Inspections and Tests:
 - 1. Check steel as received in the field for possible shipping damage workmanship, piece making and verification of required camber.
- G. Shop-Bolted Connections:
 - 1. Inspect or test in accordance with AISC specifications.
 - 2. For bolted connections (bearing-type), all connections shall be visually observed to assure that all bolts, nuts and washers are in place and that all plies of connection material have been drawn together. All bolts shall be verified to be snug tight only.
- H. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.
 - 3. Perform tests of welds as follows. Inspection procedures listed
 - a. Ultrasonic Inspection: ASTM E164. Perform on all full and partial penetration welds.
- I. Field-Bolted Connections:
 - 1. Inspect in accordance with AISC specifications.
 - 2. For bolted connections (bearing-type), all connections shall be visually observed to assure that all bolts, nuts and washers are in place and that all plies of connection material have been drawn together. All bolts shall be verified to be snug tight only.

3. Bolts in slotted holes at expansion joints shall have nuts finger tight with threads damaged.
- J. Field Welding: Inspect and test during erection of structural steel as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.
 3. Perform tests of welds as follows:
 - a. Ultrasonic Inspection: ASTM E164. Perform on all full and partial penetration welds.

END OF SECTION 051200

**SECTION 055000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Downspout boots.
- C. Cast iron bollards
- D. Cast iron trench castings.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 042000 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 051200 - Structural Steel Framing: Structural steel column anchor bolts.
- D. Section 052100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.
- E. Section 053100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
- F. Section 055133 - Metal Ladders.
- G. Section 099113 - Exterior Painting: Paint finish.
- H. Section 099123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2024.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- I. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- K. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- L. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.

- N. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- P. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- Q. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.04 SUBMITTALS

- A. See Section 013000 - 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.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Designer's Qualification Statement.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- 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.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- B. Lintels: As detailed; prime paint finish.

2.04 DOWNSPOUT BOOTS

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and on-body cleanout and cover with neoprene gaskets.
 - 1. Configuration: Angular.
 - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 - 3. Finish: Manufacturer's standard factory applied primer finish.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.
 - 6. Manufacturers:
 - a. Downspoutboots.com, a division of J. R. Hoe & Sons; ____:
www.downspoutboots.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.05 CAST IRON TRENCH CASTINGS

- A. Cast Iron Trench Castings:
 - 1. Material: Cast iron; ASTM A48/A48M, Class 35 B (heavy duty).
 - 2. Grate Type: Manufacturer's standard Type C.
 - 3. Manufacturers:
 - a. Neenah Foundry, a division of Neenah Enterprises, Inc; ____: www.nfco.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.06 FINISHES - STEEL

- A. Prime paint steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Prime Painting: One coat.
- D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating. (Provide minimum 530 g/sq m galvanized coating.)
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.07 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

**SECTION 055100
METAL STAIRS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Structural steel stair framing and supports.
- C. Handrails and guards.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. AISC 207 - Standard for Certification Programs; 2023.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- I. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.
- J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- K. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- N. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Designer's Qualification Statement.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 207.

1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
 - 2. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
 - 3. Dimensions: As indicated on drawings.
 - 4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 - 5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 - 6. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 - 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.
 - d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches (38 mm), minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 14 gauge, 0.075 inch (1.9 mm) minimum.
 - 4. Concrete Reinforcement: Welded wire mesh.

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- 5. Concrete Finish: For resilient floor covering.
 - D. Risers: Same material and thickness as tread pans.
 - 1. Nosing Depth: Not more than 1-1/2 inch (38 mm) overhang.
 - 2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch (12 mm) wide.
 - E. Stringers: Rolled steel channels.
 - 1. Stringer Depth: 10 inches (250 mm).
 - 2. End Closure: Sheet steel of same thickness as risers welded across ends.
 - F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
 - G. Railings: Steel picket railings.
 - H. Finish: Shop- or factory-prime painted.

2.03 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 - 1. Outside Diameter: 1-1/4 inch (32 mm), minimum, to 1-1/2 inches (38 mm), maximum.
- B. Guards:
 - 1. Top Rails: Round pipe or tube rails unless otherwise indicated.
 - a. Outside Diameter: 1-1/4 inch (32 mm), minimum, to 1-1/2 inches (38 mm), maximum.
 - 2. Infill at Picket Railings: Vertical pickets.
 - a. Horizontal Spacing: Maximum 4 inches (100 mm) on center.
 - b. Material: Solid steel bar.
 - c. Shape: Square.
 - d. Size: 1/2 inch (13 mm) square.
 - e. Top Mounting: Welded to underside of top rail.
 - f. Bottom Mounting: Welded to top surface of stringer.
 - 3. End and Intermediate Posts: Same material and size as top rails.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded to top surface of stringer.

2.04 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
- D. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
 - 1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
 - 2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
- E. Concrete Fill: Portland cement Type I, 3000 psi (20 MPa) 28 day strength, 2 to 3 inch (51 to 76 mm) slump.
- F. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.05 ACCESSORIES

- A. Factory Fabricated Stair Tread and Nosing:
- B. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

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- D. Shop and Touch-Up Primer: SSPC-Paint 15, and comply with VOC limitations of authorities having jurisdiction.

2.06 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
 - 1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
 - 2. Number of Coats: One.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- E. Obtain approval prior to site cutting or creating adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

END OF SECTION

**SECTION 061000
ROUGH CARPENTRY**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Structural composite lumber framing.
- B. Rough opening framing for doors, windows, and roof openings.
- C. Roof sheathing.
- D. Subflooring.
- E. Roof-mounted curbs.
- F. Roofing nailers.
- G. Roofing cant strips.
- H. Preservative treated wood materials.
- I. Fire retardant treated wood materials.
- J. Communications and electrical room mounting boards.
- K. Concealed wood blocking, nailers, and supports.
- L. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 05 1200 - Structural Steel Framing: Prefabricated beams and columns for support of wood framing.
- C. Section 05 3100 - Steel Deck.
- D. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- E. Section 07220 - Roof Board Insulation: Nailbase Insulation Panel.
- F. Section 07 3113 - Asphalt Shingles: Shingles over sheathing.
- G. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings, and self-adhered membrane flashing over sheathing.

1.03 REFERENCE STANDARDS

- A. APA PRI-400 - Performance Standard for Residential I-Joists; 2021.
- B. APA Z725 - Performance Rated I-Joists Design and Construction Guide; 2024.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2024.
- E. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2024).
- F. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.

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- G. ASTM D5055 - Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists; 2024.
 - H. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products; 2021, with Editorial Revision.
 - I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
 - J. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.
 - K. PS 1 - Structural Plywood; 2023.
 - L. PS 2 - Performance Standard for Wood Structural Panels; 2019.
 - M. PS 20 - American Softwood Lumber Standard; 2025.
 - N. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber; 2019.
 - O. SPIB (GR) - Standard Grading Rules; 2021.
 - P. WCLIB (GR) - WCLB Standard Grading Rules for West Coast & Imported Softwood Lumber No.18; 2024.
 - Q. WWPA G-5 - Western Lumber Grading Rules; 2025.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- E. Submit proposed screw pattern layout for roof sheathing attachment, such that designed roof system meets 1-90 Wind Uplift Requirements.
- F. Submit data sheets and samples of all fasteners.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Southern Pine, unless otherwise indicated.
 - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading

service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. Northeastern Lumber Manufacturer's Association (NeLMA).
 - 2. National Lumber Grades Authority (NLGA).
 - 3. Redwood Inspection Service (RIS).
 - 4. Southern Pine Inspection Bureau (SPIB).
 - 5. West Coast Lumber Inspection Bureau (WCLIB).
 - 6. Western Wood Products Association (WWPA).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm)):
 - 1. Species: Allowed under referenced grading rules.
 - 2. Grade: No. 2.
- E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 mm through 100 by 400 mm)):
 - 1. Machine stress-rated (MSR) as follows:
 - a. Fb-single; minimum extreme fiber stress in bending: 1350 psi (9,300 kPa).
 - b. E; minimum modulus of elasticity: 1,300,000 psi (8960 MPa).
 - 2. Species: Southern Pine, No. 2.
 - 3. Extent: As required, or indicated.
- F. Roof Sleepers (1 by 4 inches).
 - 1. Species: Southern Yellow Pine.
 - 2. Grade: Construction or No. 2.
 - 3. Extent: Roof "Sleepers", and elsewhere as required or indicated.
- G. For Structural Framing, 5 inches and wider, provide the following grade and species:
 - 1. "No. 2" grade, Stress Rated, with the following minimum properties:
 - a. Fb = As indicated in Design Values for Wood Construction - NDS Supplement By The American Wood Council, LATEST Edition.
 - b. E = As indicated in Design Values for Wood Construction - NDS Supplement By The American Wood Council, LATEST Edition.
 - 2. Species: Southern Yellow Pine.
- H. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 STRUCTURAL COMPOSITE LUMBER

- A. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.
- B. Structural Composite Lumber Materials: Factory-fabricated engineered wood products consisting of wood veneers, strands, or flakes pressed with moisture-resistant adhesive into blocks of material, evaluated in accordance with ASTM D5456.
 - 1. Laminated Veneer Lumber (LVL): Engineered wood products consisting of thin wood veneer bonded together with adhesive with grain of veneers running parallel to long dimension.

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- a. Manufacturer's Published Modulus of Elasticity, E: 1,800,000 psi (12,410 MPa), minimum.
 2. Parallel Strand Lumber (PSL): Engineered wood products consisting of long wood strands bonded together with adhesive with grain running parallel to long dimension.
 - a. Strand Length-to-Thickness Ratio: Approximately 300.
 - b. Manufacturer's Published Modulus of Elasticity, E: 1,800,000 psi (12,410 MPa), minimum.
 3. Laminated Strand Lumber (LSL): Engineered wood products consisting of flaked wood strands bonded together with adhesive.
 - a. Strand Length-to-Thickness Ratio: Approximately 150.
 - b. Manufacturer's Published Modulus of Elasticity, E: 1,800,000 psi (12,410 MPa), minimum.
 4. Oriented Strand Lumber (OSL): Engineered wood product consisting of flaked wood strands bonded together with adhesive.
 - a. Strand Length-to-Thickness Ratio: Approximately 75.
 - b. Manufacturer's Published Modulus of Elasticity, E: 1,800,000 psi (12,410 MPa), minimum.
- C. Structural Composite Lumber Assemblies:
1. Wood I-Joists: Factory-prefabricated engineered wood structural members consisting of structural composite flanges and oriented strand board webs, bonded together with adhesive, evaluated in accordance with ASTM D5055.
 - a. Live Load Deflection: L/480, maximum.
 - b. Depth: 14 inches (356 mm).
 - c. Joist Series: PRI-20 in accordance with APA PRI-400.
 - d. Markings: Comply with APA Z725.
 2. Structural Composite Lumber Assemblies:
 - a. Wood I-Joists: Factory-prefabricated engineered wood structural members consisting of structural composite flanges and oriented strand board webs, bonded together with adhesive, evaluated in accordance with ASTM D5055.
 - 1) Live Load Deflection: L/480, maximum.
 - 2) Depth: 16 inches (406 mm).
 - 3) Joist Series: PRI-20 in accordance with APA PRI-400.
 - 4) Markings: Comply with APA Z725.
 - 3.

2.04 EXPOSED BOARDS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (15 percent maximum).
- C. Surfacing: S4S.
- D. Species: Southern Pine.
- E. Grade: No. 2, 2 Common, or Construction.

2.05 CONSTRUCTION PANELS

- A. Subflooring: Oriented strand board wood structural panel; PS 2, rated Single Floor.
 1. Performance Category: 19/32 PERF CAT.
 2. Span Rating: 20.
 3. Edges: Square.
 4. Surface Finish: Fully sanded face.

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5. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 200 days.
 6. Provide fastening guide on top panel surface with separate markings indicating fastener spacing for 16 inches (406 mm), 19.2 inches (488 mm) and 24 inches (610 mm) on center, respectively.
- B. Roof Sheathing: APA RATED SHEATHING, Veneer Core Plywood; Tongue and Groove Edges, or Square Edges with Sheathing Panel Clips, and as follows:
1. Exposure Durability Classification: Exterior.
 2. Span Rating: As required to suit rafter spacing indicated.
 - a. 42/20 minimum, unless otherwise indicated.
 3. Thickness: 3/4-inch.
- C. Roof Sheathing: Fiberglass mat faced gypsum panel, with water resistant gypsum core. ASTM C1177/C1177M, square long edges, 5/8 inch Type X fire-resistant (16 mm Type X fire-resistant), unless otherwise indicated.
1. GAF; Dens-Deck Prime Roof Board: www.gaf.com.
 2. Georgia-Pacific Gypsum LLC; DensDeck Prime Roof Board: www.densdeck.com.
 3. USG; Securock: www.usg.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
- D. Communications and Electrical Room Mounting Boards: UL verified fire retardant backboard: A-C plywood; 3/4 inch (19 mm) thick; Coated with UL Classified Fire Retardant Latex (Class "A" Rated). Tested to UL723 (ASTM E84) standards. Color: As selected by Architect from manufacturer's standard colors.
1. Pre-Manufactured Product:
 - a. WoodBacker "Fire Retardant Backboards"; [Basis of Design]: www.woodbacker.com.
 - b. U-TECK; Fire Retardant Backboard: www.uteck.com
 - c. Readyspec Backboards, Inc; Fire Retardant Backboard: www.pathways-spaces.com/
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- E. Other Applications:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 3. Other Locations: PS 1, C-D Plugged or better.

2.06 ACCESSORIES

- A. Fasteners and Anchors:
1. Metal and Finish: AISI Type 304 or 316 Stainless steel for fire-retardant wood and preservative-treated wood locations; hot-dipped galvanized steel per ASTM A 153/ A 153M for rough carpentry exposed to weather, in ground contact, or area of high relative humidity; unfinished steel elsewhere. Acceptable to manufacturer of wood treatment materials and manufacturer of fasteners.
 2. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Metal Framing Anchors:
1. General: Provide metal framing anchors of type, size, metal, and finish indicated that comply with requirements specified including the following:
 - a. Current Evaluation/Research Reports: Provide products for which model code evaluation/research reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with the building code in effect for this Project.

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- b. Allowable Design Loads: Provide products for which manufacturer publishes allowable design loads that are determined from empirical data or by rational engineering analysis and that are demonstrated by comprehensive testing performed by a qualified independent testing laboratory.
 - 2. Galvanized Steel Sheet: Steel sheet zinc-coated by hot-dip process on continuous lines prior to fabrication to comply with ASTM A 525 for Coating Designation G90 and with ASTM A 446, Grade A (structural quality); ASTM A 526 (commercial quality); or ASTM A 527 (lock-forming quality); as standard with manufacturer for type of anchor indicated.
 - a. Use galvanized steel framing anchors for rough carpentry exposed to weather, in ground contact, or in area of high relative humidity, and all other locations, and at every point of bearing.
 - b. Minimum Thickness: 18-gauge.
 - C. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
 - D. Panel Sheathing Clips: Provide panel sheathing clips in quantity and location recommended by manufacturer. For use for all unsupported edges. Simpson Stong-Tie Panel Sheathing Clips PSCA, 20 gauge, galvanized. Substitutions: Section 01 6000 - Product Requirements.
 - E. Nails, Wire, and Brads: FS FF-N-105.
 - F. Power Driven Fasteners (screws): National Evaluation Report NER-272.
 - G. Wood Screws: ANSI B18.6.1.
 - H. Lag Bolts: ANSI B18.2.1.
 - I. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.
 - J. Anchors shall be manufactured by American manufacturer.
 - K. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.

2.07 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA 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 AWWA standards.
- B. Fire Retardant Treatment:
 - 1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Do not use treated wood in direct contact with the ground.
 - 2. Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated;

capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.

- a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. All interior rough carpentry items in buildings of Type I or Type II construction are to be fire retardant treated.
 - c. All concealed wood blocking, framing and sheathing in buildings of Type I or Type II construction shall be fire retardant treated.
 - d. Review Life Safety Sheets and provide fire retardant treated wood blocking in all rated walls.
 - e. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - a. Treat lumber exposed to weather.
 2. Treat lumber in contact with roofing, flashing, or waterproofing.
 3. Treat lumber in contact with masonry or concrete.
 4. Treat lumber less than 18 inches (450 mm) above grade.
 - a. Treat lumber in other locations as indicated.
 5. Preservative Pressure Treatment of Plywood Above Grade: AWWA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with roofing, flashing, or waterproofing.
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood less than 18 inches (450 mm) above grade.
 - e. Treat plywood in other locations as indicated.
- D. Preservative Pressure Treatment of Lumber in Contact with Soil: AWWA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

2.08 ENGINEERED WOOD PRODUCTS

- A. General: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project.
1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated.
Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Lab casework.
 - 3. Wall brackets.
 - 4. Handrails.
 - 5. Grab bars.
 - 6. Towel and bath accessories.
 - 7. Wall-mounted door stops.
 - 8. Chalkboards and marker boards.
 - 9. Wall paneling and trim.
 - 10. Joints of rigid wall coverings that occur between studs.

3.04 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.
- B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges use sheathing clips where joints occur between roof framing members, unless tongue and groove sheathing is used.
 - 2. Provide sheathing clips at all unsupported edges.
- C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

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- D. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 3. Install adjacent boards without gaps.
 4. Size and Location: As indicated on drawings.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet (1 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.
- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.07 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 5000.
 1. Comply with applicable regulations.
 2. Do not burn scrap on project site.
 3. Do not burn scraps that have been pressure treated.
 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**SECTION 062000
FINISH CARPENTRY**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 06 4000 - Architectural Woodwork: Wood frames, countertops, etc.
- D. Section 08 1416 - Flush Wood Doors.
- E. Section 09 9100 - Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2024.
- D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide instructions for attachment hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Submit one sample of lumber or finish plywood, 12 by 12 inch (____ by ____ mm) in size, and two samples 3 by 3 inch in size, illustrating wood grain and specified finish.
- E. Samples: Submit two samples of wood trim 6 inch (____ mm) long.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Premium grade.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire retardant requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect from moisture damage.

1.08 PROJECT CONDITIONS

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- B. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Quality Standards Illustrated for Premium Grade.

2.02 WOOD-BASED COMPONENTS

2.03 LUMBER MATERIALS

- A. Softwood Lumber: SYP species, maximum moisture content of 6 percent of quality suitable for transparent finish.
- B. Hardwood Lumber: white or yellow poplar species (coordinate with other wood trim), maximum moisture content of 6 percent.

2.04 SHEET MATERIALS

- A. Softwood Plywood: PS 1 Grade A-B; Veneer core; SYP face species, (or similar species permitted by reference standards).
- B. Hardwood Plywood: HPVA HP-1, Grade AA, Type I at exterior, Type II at Interior; Veneer core, type of glue recommended for application; Natural Birch face species, Rotary cut.

2.05 PLASTIC LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, HGS See Finish Legend for manufacturer and color.

2.06 ADHESIVE

- A. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.07 FASTENINGS

- A. Fasteners: Of size and type to suit application; galvanized finish in concealed locations and stainless steel finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

2.08 ACCESSORIES

- A. Lumber for Shimming, Blocking: Softwood lumber of SYP species.
- B. Primer: Alkyd primer sealer.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

2.09 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate

counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)

2.10 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Stain: As selected by Architect.
 - c. Sheen: Flat.
 - 2. Opaque:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Color: As selected by Architect.
 - c. Sheen: Flat.
- E. Prime paint surfaces in contact with cementitious materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify wall surface is free of bows, humps, and other deficiencies that will be emphasized by the trim work. Report these issues to the Prime Contractor.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.
- D. Install interior trim with wall adhesive by gun application. Install exterior trim and components with hot-dipped galvanized or stainless steel nails at 12" o.c., unless recommended otherwise by manufacturer.
- E. Match grains and color so that individual pieces do not stand out.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 9100 - Painting.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

**SECTION 064000
ARCHITECTURAL WOODWORK**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Laminate clad countertops.
- B. Laminate covered cabinets.
- C. Wood cabinets, desks, and paneling.
- D. Solid surface countertops, backsplashes and trim, where indicated; and vertical panels, where indicated.
- E. Manufactured quartz solid surface countertop, backsplashes and trim, where indicated; and vertical panels, where indicated.
- F. Closet and utility shelving (paint on site, under Section 09 9100).
- G. Wood frames, sidelights, panels, base, window sills, and miscellaneous trim (paint on site, under Section 09 9100), stained (transparent finish) or painted (opaque finish) where indicated.
- H. Hardware for architectural woodwork.
- I. Related work and trim for above items.
- J. Extent of each type of architectural woodwork is indicated on drawings and in schedules.
- K. Architectural woodwork and components for opaque finish are intended to be finish painted on-site, under Section 09 9100.
- L. Architectural woodwork and components for natural, stained and/or transparent finish are intended to be painted in woodwork fabricator's shop under controlled conditions, under the work of this Section.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Related work specified elsewhere includes:
 - 1. Section 06 1000 - Rough Carpentry.
 - 2. Section 06 2000 - Finish Carpentry.
 - 3. Section 07 9005 - Joint Sealers.
 - 4. Section 08 1416 - Flush Wood Doors.
 - 5. Section 09 9100 - Painting.
 - 6. Section 12 3219 - Laminate Casework.

1.03 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, attachment devices, blocking requirements and other components.
 - 1. Manufacturer's current and complete product data, for manufactured units of work, including color selection data, samples, and anchorage systems.
- B. Samples: Submit the following samples:
 - 1. Lumber and panel products with or for transparent finish; 6-inches x 3/4-inch x 18-inches, for each species and cut, finished on 1-side and 1-edge. Also submit two 3 by 3 inch samples with finish on 1-side.
 - 2. Cabinet Hardware: One unit of each type and finish, which will be returned for use on the project, upon request by the Contractor.

3. Quartz Solid Surface: Manufacturer's standard samples, approximately 6-inches x 6-inches with finish as required for this project, and representative color range anticipated.
4. Solid Surfacing and Plastic Laminate Products: Manufacturer's standard samples, approximately 4-inches x 6-inches, with finish as required for this project, and representative color range anticipated.

1.04 QUALITY ASSURANCE:

- A. AWS: Comply with applicable requirements of "Architectural Woodwork Standards" published by the Architectural Woodwork Standards, 2nd Edition, October, 2014.
- B. Fabricator Qualifications: Fabricators shall be experienced firms specializing in the types of architectural woodwork required for this project for at least 5-verifiable years and on at least 10-verifiable projects of similar size, scope, complexity, and quality as this project.
 1. Quartz Fabricator: 5-years and 10-verifiable projects.
 2. Solid Surfacing Fabricator: 5-years and 10-verifiable projects.
- C. Installer Qualifications: Arrange for installation of architectural woodwork by the fabricator, or by a firm under the control and direction of the fabricator, which can demonstrate at least 5-verifiable years successful experience in installing architectural woodwork items on at least 5-verifiable projects, similar in type and quality to those required for this project.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver woodwork, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.06 PROJECT CONDITIONS:

- A. Conditioning: Woodwork Manufacturer and Installer shall advise Contractor of temperature and humidity requirements for woodwork installation and storage areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
- B. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0-percent tolerance of optimum moisture content, from date of installation through remainder of construction period. Require Woodwork Manufacturer to establish optimum moisture content and required temperature and humidity conditions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Laminate Clad and Wood Cabinet Manufacturers: Subject to compliance with requirements, provide premium grade, custom made cabinets and woodwork from a millwork shop complying with requirements of "Quality Assurance" article above.
- B. Plastic Laminate Manufacturer: See Finish Legend for Manufacturers and colors.
- C. Quartz-Surfacing Material: Subject to compliance with requirements, provide quartz countertop material of one the following. Color and finish indicated in finish legend and schedule:
 1. Substitutions: See Section 01 6000 - Product Requirements.
- D. Solid-Surfacing Material/Manufacturer: Homogeneous solid sheets of cast, filled acrylic resin complying with material and performance requirements in ANSI Z124.3, for Type 6. Color and finish indicated in finish legend and schedule:
 1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FABRICATION, GENERAL:

- A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.
- B. Fabricate woodwork to dimensions, profiles, and details indicated with dowel, dado, glue and screw construction, with openings and mortises precut, where possible, to receive hardware and other items and work.
 - 1. Ease edges to a 1/16-inch radius, for corners of cabinets and edges of solid wood (lumber) members less than 1-inch in nominal thickness, 1/8-inch radius for edges of rails and similar members over 1-inch in nominal thickness.
- C. Complete fabrication, assembly, hardware application, and other work before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Pre-Cut Openings: Fabricate architectural woodwork with pre-cut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.
- E. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit. A tight fit of less than 1/8-inch is expected.
- F. Products in this Section shall be constructed only of materials that are formaldehyde-free.

2.03 FIRE-RETARDANT MATERIALS:

- A. Where fire-retardant treated lumber is indicated, provide materials which are pressure impregnated with fire-retardant chemicals and comply with the following requirements:
 - 1. As required to comply with referenced standards and finish classifications necessary as per the Standard Building Code, NFPA 101 - Life Safety Code, authorities having jurisdiction, and acceptable in all respects for indoor use and finish requirements.
 - 2. Fire-Retardant Chemicals: Use chemicals of type and for applications indicated which do not bleed-through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated lumber from untreated lumber.
- B. Fire Performance Characteristics: Provide materials which are identical to those tested per ASTM methods and time periods indicated, are marked and listed for fire performance characteristics by Underwriters Laboratories, Inc., or other testing and inspecting agency acceptable to authorities having jurisdiction, and comply with the following requirements:
 - 1. Mill lumber after treatment, within limits set for wood removal which does not affect listed fire performance characteristics, using a woodworking plant certified by testing and inspecting agency.
- C. Marking: Identify treated lumber with separable paper classification marking of inspecting and testing agency, unless otherwise indicated.
- D. Surface Burning Characteristics: Not exceeding values required by latest edition of the "Standard Building Code" and "NFPA 101" (with amendments), tested per ASTM E 84 for standard time period.
 - 1. Flame Spread: Per Code.
 - 2. Smoke Developed: Per Code.

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- E. Kiln-dry woodwork after treatment to levels required for non-fire-retardant treated woodwork materials. Maintain moisture content required by kiln drying, before and after treatment.
 - 1. Discard treated lumber which does not comply with requirements of referenced woodworking standard. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective lumber.

2.04 STANDING AND RUNNING TRIM:

- A. Quality Standard: Comply with AWS Section 6 - Interior Millwork.
- B. Rout or groove backs of flat trim members, kerf backs of other wide flat members, except for members with ends exposed in finished work.
- C. Assemble Casings in plant except where limitations of access to place of installation require field assembly.
- D. Interior Trim for Transparent Finish (typical finish unless specifically indicated otherwise): Comply with the following requirements:
 - 1. Grade: Premium, Grade I.
 - 2. Lumber Species: Walnut.
 - 3. Cut: Plain Sliced.
 - 4. Locations: Provide stained transparent finish within rooms which have new woodwork with transparent finish, at indicated areas. Refer to Elevations.
- E. Interior Trim for Opaque Finish (only where specifically indicated, if any): Comply with the following requirements:
 - 1. Grade: Custom. Grade II.
 - 2. Lumber Species: Any closed-grain hardwood listed in referenced woodworking standard.
 - 3. Cut: Plain or Rotary cut.
 - 4. Locations: Provide opaque finish within rooms which have new woodwork with opaque finish, unless indicated otherwise. Refer to Elevations and Finish Legend.

2.05 ARCHITECTURAL COUNTER TOPS:

- A. Quality Standard: Comply with AWS, Edition 1 - Section 11-Countertops.
- B. Type of Top - Laminate Clad:
 - 1. Grade: Premium; Grade I.
 - 2. Edge Treatment: Refer to Drawings.
 - 3. Core: Minimum 47-lb. density particle board, except at least 3/4-inch A-B plywood with exterior glue (approved for interior use), at tops with sinks and/or plumbing fixtures.
 - 4. Minimum Thickness: 1-1/4-inches at tops and 3/4-inch at splashes, unless indicated otherwise on the Drawings.
- C. Type of Top - Quartz: Homogeneous mixture containing 93% pure quartz with additions of high performance polyester resin, pigments and special effects.
 - 1. Performance:
 - a. Moisture Absorption: typical results 0.02%; ASTM C97.
 - b. Modulus of Rupture: typical results 6,800 psi; ASTM C99.
 - c. Compressive Strength: typical results 24,750 psi; ASTM C170.
 - d. Abrasion Resistance: typical results 223; ASTM C501.
 - e. Bond Strength: typical results 205 psi; ASTM C482.
 - f. Thermal Shock: passes 5 cycles: ASTM 484.
 - g. Breaking Strength of Tile: typical results 3,661 lbf; ASTM C648.
 - h. Coefficient of Friction Pull Method: 75 avg. dry/ .55 avg. wet; ASTM C1028.
 - i. Surface Burning Characteristics: typical results 17; ASTM E84.
 - j. Smoke Density: flaming 196, non-flaming 69; ASTM E662.

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- k. Stain Resistance: Unaffected; ANSI Z124.6.
 - 2. Accessories:
 - a. Mounting Adhesive: Structural grade 50-year silicone or epoxy adhesive.
 - b. Quartz Surface Adhesive: Epoxy or polyester adhesive of type recommended by manufacturer for application and conditions of use. (Adhesive which will be visible in finished work shall be tinted to match quartz surface.)
 - c. Sealant: Clear sealant of type recommended by manufacturer for application and use. Provide anti-bacterial type in toilet, bath, or kitchen areas. (Sealants specified in Section 07 9005 - Joint Sealers).
 - d. Solvent: Denatured alcohol for cleaning quartz surfacing to assure adhesion of adhesives and sealants.
 - e. Cleaning Agents: Mild soap and water.
 - 3. Edge Treatment: As indicated on Drawings.
 - 4. Laminations:
 - a. Laminate layers of quartz surfacing as required to create required thicknesses following procedures recommended by the manufacturer.
 - 5. Pattern, Color, and Finish: See Finish Legend.
 - 6. Thickness: 1 cm for vertical surfaces; 2 cm for horizontal surfaces, unless indicated otherwise.
- D. Types of Top (and/or panel): Solid Surfacing.
- 1. Colors, Patterns and Finishes: As indicated, or if not indicated, as selected from any of manufacturer's standard finishes and colors.
 - 2. Edge Treatment: As indicated on the Drawings.
 - 3. Thickness - Tops and Substrates:
 - a. Tops (and any flat vertical panels): 3/4-inch, with 1-1/4-inch built-up edges unless indicated otherwise on the Drawings.
 - b. Backsplash: 1/2-inch.
 - c. Edge Treatment: As indicated on the Drawings, or if not indicated, ease all exposed edges to 1/16" radius, and seam width of less than 1/8".
 - 1) DuPont-approved adhesive to create color-matched seam.
 - d. Substrates: Refer to the Drawings for thickness of plywood below solid surface tops, splashes, etc., or if not indicated, at least 3/4-inch thick at horizontal and sloped surfaces (and at least 1/2-inch thick at any vertical panels).
 - 4. Allowable tolerances:
 - a. Flat and true to within 1/8" of a flat surface over a 10' length.
 - b. Allow a minimum of 1/16" to a maximum of 1/8" clearance between surface and each wall.
 - c. Variation in Component Size: 1/8" over a 10' length.
 - d. Location of Openings: 1/8" from indicated location.
 - 5. Provide manufacturer's 10-year warranty against defects in materials.
 - a. Warranty shall provide material to repair or replace defective materials.
 - b. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
 - c. The above warranty shall be in addition to, shall be in effect simultaneously with, and shall not limit or alter other project or product warranties or guarantees, nor shall it serve as limitation to other remedies available to the Owner.

2.06 FASTENERS AND ANCHORS:

- A. Screws: Select material, type, size and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

- B. Nails: Select material, type, size and finish required for each use. Comply with FS FF-N-105 for applicable requirements.
- C. Anchors: Select material, type, size and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot- dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion-resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

2.07 FINISHING OF INTERIOR ARCHITECTURAL WOODWORK:

- A. Quality Standard: Comply with AWS Section 5, unless otherwise indicated.
- B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing of concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.
- C. Interiors for wood cabinets: To match wood veneer.
- D. Melamine cladded interiors for wood cabinets: To match HPDL.

2.08 ARCHITECTURAL WOOD VENEER CABINETS:

- A. Quality Standard:
 - 1. Comply with AWS Section 10.
 - 2. Grade: Premium.
 - 3. Design: Flush Overlay - Type A- Frameless construction.
- B. Wood Veneer Cladding: As follows:
 - 1. Grade; Premium, Grade I.
 - 2. Lumber Species: Select White Birch, unless scheduled otherwise.
 - 3. Cut: Plain sliced.
- C. Hardboard: AHA A135.4 (tempered).
- D. Core Materials:
 - 1. MR Moisture Resistant Medium Density Fiberboard: Average 47-pound density grade, ANSI A208.2.
 - 2. Grade AB Plywood.

2.09 ARCHITECTURAL LAMINATE CLAD CABINETS:

- A. Quality Standard:
 - 1. Comply with AWS Section 10.
 - 2. Grade: Premium.
 - 3. Design: Flush overlay - Type A- Frameless construction.
- B. Laminate Cladding: High pressure decorative laminate complying with NEMA LD 3 and as follows:
 - 1. Colors, Patterns and Finishes: As indicated or, if not otherwise indicated, as selected by Architect from laminate manufacturers' standard products in the following categories: Solid, stippled, textured, wood grain and/or patterned colors; Thru-color type.
 - 2. Provide specific types as scheduled.
 - a. Horizontal Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - b. Vertical Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - c. Post-Formed Horizontal Surfaces: HGP, 0.039 inch (1.0 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.

- d. Post-Formed Vertical Surfaces: VGP, 0.028 inch (0.71 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - e. Flame Retardant Surfaces: HGF, 0.048 inch (1.22 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - f. Cabinet Liner: CLS, 0.020 inch (0.51 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - g. Laminate Backer: BKL, 0.020 inch (0.51 mm) nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
- C. Hardboard: AHA A135.4 (tempered).
 - D. Melamine cladded interiors in laminate cabinets.
 - E. Core Materials:
 - 1. MR Moisture Resistant Medium Density Fiberboard: Average 47-pound density grade, ANSI A208.2.

2.10 FLUSH WOOD PANELING AND WAINSCOTS FOR TRANSPARENT FINISH (IF ANY):

- A. Quality Standard: Comply with AWI Section 500 requirements for flush wood paneling.
 - 1. Grade: Premium.
- B. Wood Species: AWS Veneer Grade AA, Select Walnut, or equivalent priced veneer as selected by Architect after bidding; Quarter Sliced; Balanced Center Book Match and End Match.
 - 1. Lumber Trim and Edges: At panelwork fabricator's option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.
- C. Panel-Matching Method: No matching between panels is required. Select panels for similarity of grain pattern and color, and arrange sequence of panels for optimum color and grain matching between adjacent panels.
- D. Horizontal and Vertical Panel-Matching Method: End match/edge match.

2.11 INTERIOR FRAMES AND JAMBS

- A. Quality Standard: Comply with AWS Section 10.
 - 1. Grade: Premium.
- B. Wood Species:
 - 1. For Opaque Finish: Any closed-grain hardwood listed in referenced woodworking standard.
 - 2. For Transparent Finish (stained): Walnut.
- C. Fire Rated Frames:
 - 1. 20 min and 45 min rated types. Refer to Door Schedule.
- D. Jamb Type: Flat jamb, unless indicated otherwise.

2.12 CLOSET AND UTILITY SHELVING:

- A. Plastic laminate shelving where indicated.
- B. Quality Standard: Comply with AWS Section 6.
- C. Shelving for Opaque Finish: Comply with the following requirements:
 - 1. Grade: Custom.
 - 2. Shelving Material: Birch faced veneer core plywood.
 - 3. Exposed Edging: Solid hardwood.
 - 4. Thickness: 1-inch at wood shelves, unless indicated otherwise

- D. Shelving for Transparent Finish: Comply with the following requirements:
 - 1. Location: Only in rooms where specifically indicated on Drawings.
 - 2. Grade: Custom.
 - 3. Species: AWS Veneer Grade A, Select Red Oak, or White or Yellow Poplar, Rotary Cut (unless scheduled otherwise).
 - 4. Thickness (plywood): 1-inch (minimum), with solid wood nosing.
 - 5. Lumber for shelving, only where indicated on the Drawings: 5/4-inch with nosings as indicated.

2.13 FASTENERS AND ANCHORS:

- A. Screws: Select material, type, size and finish required for each use. Comply with FS FF-S-111 for applicable requirements.
- B. Nails: Select material, type, size and finish required for each use. Comply with FS FF-N-105 for applicable requirements.
- C. Anchors: Select material, type, size and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion-resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

2.14 CABINET HARDWARE AND ACCESSORY MATERIALS:

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items which are specified in Section 08 7100 - Finish Hardware.
- B. Hardware Standard: Comply with ANSI/BHMA A156.9 "American National Standard for Cabinet Hardware" for items indicated by reference to BHMA numbers or referenced to this standard.
- C. Hardware Finishes: Comply with BHMA 1301 for finishes indicated by BHMA Code Numbers or if not otherwise indicated, provide finishes complying with requirements indicated.
 - 1. For exposed hardware comply with requirements indicated for finish and base indicated at the end of this Section.
 - 2. For concealed hardware provide manufacturer's standard finishes which comply with product class requirements of ANSI/BHMA A156.9, and which match exposed hardware on same cabinet unit.

2.15 SHELVING SUPPORTS AND RODS

- A. Wall Mounted Brackets and Standards:
 - 1. Adjustable, double slotted, extra-heavy duty:
 - a. Equivalent to K&V No. 85/185 Series Extra Duty Standards & Brackets.
 - 1) Standards: 1-1/4" wide x 1/2" deep x length indicated. 16 ga. steel. Finish & Color: TBS.
 - 2) Brackets: Vertically adjustable in 1" increments. 14 ga. & 16 ga. steel. Finish & Color: TBS.
 - 2. Clothes Rods:
 - a. Closet Hanger Rod and Support:
 - 1) Rod: Equivalent to K&V No. 770-1. Extra-Duty. Steel. Chrome double-plated finish. Provide with end caps.
 - 2) Flanges: Equivalent to K&V No. 734 and No. 735, two (2) each per rod. Zinc cast. Finish: Match rod.
 - 3) Supports: Fixed closet rod and shelf brackets. Extra-Duty. Equivalent to K&V No. 1198. 10 ga. steel construction. Finish & Color: TBS.

B. CLOSET AND UTILITY SHELVING HARDWARE:

1. Pilaster Standards and Supports: Provide adjustable shelf standards and related supports of type indicated, with matching finish on fasteners and accessories.
 - a. Vertical Slotted Standard:
 - 1) Mortise mounted, 5/8-inch wide x 3/16-inch deep x length indicated; high strength steel.
 - 2) Equivalent to K&V No. 255, Finish & Color: TBS.
 - b. Shelf Support:
 - 1) Shelf support clip; High strength steel.
 - 2) Equivalent to K&V No. 256, Finish & Color: TBS.

2.16 SPECIALTY ITEMS

A. COUNTERTOP SUPPORT

1. Countertop support brackets, undercounter support frames, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and epoxy powder painted. Color shall be as selected by Architect from manufacturer's standard colors.
 - a. Support brackets shall be equal to Rakks EH Counter Support Bracket unless otherwise noted.
 - 1) For concealed support, provide Inside Wall Flush-Mount bracket.

2.17 CABINET HARDWARE

- A. Cabinet Hinges: 170-degrees adjustable "CLIP System" concealed self-closing hinges as manufactured by Julius Blum, Inc., or equivalent by Grass or Stanley.
 1. Finish shall match hardware finish specified in Section 08 7100 - Finish Hardware in room(s) where occurs.
- B. Cabinet Door and Drawer Pulls:
 1. Wire pulls equivalent to Hickory Hardware Bar Pulls 3-3/4" Center to center smooth Round Bar Cabinet hardware/drawer pull #HH075594-MB. Color: Satin Silver. Pull design shall comply with the Americans with Disability Act (ADA).
- C. Cabinet Door Catches: Manufacturer's standard 2-screw sill mounted unit made of molded nylon, lipped over sill to form bumper and hold in place, with 2-screw mounted heavy door mounted unit with nylon roller; provide spring-mounted units where required.
 1. Acceptable Manufacturers: Any of manufacturers listed for other cabinet hardware.
- D. Cabinet Drawer Slides: Heavy Duty, non-corrosive (galvanized) full extension ball bearing slides rated at 100-pounds, with positive stop, and self-closing and lift-out disconnect features; Model No. 1429, as manufactured by Knappe & Vogt, or equivalent by Blum or Grant.
 1. At legal size drawers, use K&V No. 1483 or equivalent, rated at 150-pounds, with same features as noted above.
- E. Cabinet Shelf Standards: Manufacturer's standard steel units with anchors and supports 5/8-inch wide x 3/16-inch high, adjustable on 1/2-inch centers; Series 255, as manufactured by K&V, or equivalent by Grant or Stanley.
 1. Wood Cabinets: Model No. 255 BRN with No. 256 BRN supports and matching fasteners.
 2. Omit standards where fixed shelves are indicated.
 3. All standards to be recess mounted (flush in routed dados), unless specifically indicated otherwise.
- F. Cabinet Locks: Where indicated on the Drawings, provide cabinet manufacturer's standard 5-disc tumbler, cam type, keyed differently at each room, with metal strike screwed to wood surface, and master keyed.
 1. Furnish 2-keys for each lock.

2. Furnish 5-master keys
3. Finish to match Section 08 7100 - Finish Hardware finish in room(s) where occurs.
4. Location: Where indicated.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.
- B. Pre-Installation Meeting: Meet at project site prior to delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor; Architect and other Owner Representatives (if any); Installers of architectural woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be maintained.
- C. Deliver concrete inserts and similar anchoring devices to be built into substrates, well in advance of time substrates are to be built.
 1. Coordinate location and placement of concealed treated blocking (by others) prior to finish materials installations.
- D. Prior to installation of architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.02 INSTALLATION:

- A. Quality Standard: Install woodwork to comply with AWS Section 2, 6, 10, 11 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8-inch in 8'-0" for plumb and level (including tops); and with no variations in flushness of adjoining surfaces.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
 1. Seal all hardware cuts, routed slots, etc., before installation of hardware.
- D. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.
- E. Standing and Running Trim, and Sills: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners and comply with referenced Quality Standards for joinery.
- F. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated. Maintain veneer sequence matching (if any) of cabinets with transparent finish.
 1. Install cabinets with no more than 1/8-inch in 96-inches sag, bow, or other variation from a straight line.

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- G. Wood Storage Shelving: Complete the assembly of units and install in the areas indicated, including hardware and accessories as indicated.
 - H. Tops: Anchor securely to base units and other support systems indicated. Caulk space between backsplash and wall with specified sealant.
 - 1. Install countertops with no more than 1/8-inch in 96-inches sag, bow, or other variation from a straight line.
 - I. Wood Panels: Anchor panels to supporting substrate with concealed panel-hanger clips and by blind nailing on backup strips, splined-connection strips, and similar associated trim and framing. Do not face nail unless otherwise indicated.
 - 1. Install flush panels with no more than 1/16-inch in 96-inches vertical cup or bow and 1/8-inch in 96-inches horizontal variation from a true plane.
 - J. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
 - K. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.
 - L. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. and within 6 inches of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
 - M. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on brackets, and supports.
 - 1. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.
 - N. Install rod flanges for rods as indicated. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Install rods in rod flanges.
 - O. Refer to Section 09 9100 - Painting, for final finishing of installed architectural woodwork which is indicated to be painted on-site.

3.03 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION:

- A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.
- D. Complete the finishing work specified as work of this section, to whatever extent not completed at shop or prior to installation of woodwork.
- E. Provide final protection and maintain conditions, in a manner acceptable to Fabricator and Installer, which ensures architectural woodwork being without damage or deterioration at time of substantial completion.

END OF SECTION

**SECTION 071113
BITUMINOUS DAMPPROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bituminous dampproofing.

1.02 REFERENCE STANDARDS

- A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2023).
- B. ASTM D449/D449M - Standard Specification for Asphalt Used in Dampproofing and Waterproofing; 2003 (Reapproved 2021).
- C. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).
- D. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013, with Editorial Revision (2019).
- E. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2018).
- F. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- C. Installer's qualification statement.

1.04 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Karnak Corporation; _____: www.karnakcorp.com/#sle.
- B. Mar-flex Waterproofing & Building Products; _____: www.mar-flex.com/#sle.
- C. W. R. Meadows, Inc; _____: www.wrmeadows.com/#sle.
- D. Substitutions: See Section 016000 - Product Requirements.

2.02 BITUMINOUS DAMPPROOFING

- A. Bituminous Dampproofing: Cold-applied, spray-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by spray, brush, roller, or squeegee; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition: ASTM D4479/D4479M Type I, asbestos free.
 - 2. VOC Content: Not more than permitted by local, State, and federal regulations.
 - 3. Applied Thickness: 1/16 inch (1.5 mm), minimum, wet film.
 - 4. Products:
 - a. W. R. Meadows, Inc; Sealastic Spray-Mastic: www.wrmeadows.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.03 BITUMEN MATERIALS

- A. Cold Asphaltic Type:
 - 1. Emulsified Asphalt: ASTM D1227/D1227M, with fiber reinforcement other than asbestos, Type II, Class 1 or 2.
 - 2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.03 APPLICATION

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Foundation Walls: Patch disturbed areas of existing dampproofing with two additional coats of dampproofing of the same generic type.
- C. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- D. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- E. Prime surfaces at a rate approved by manufacturer for application indicated, and allow primer to dry thoroughly.
- F. Apply bitumen by spray application.
- G. Apply bitumen at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F (14 degrees C); do not exceed finish blowing temperature for four hours.
- H. Apply bitumen in two coats, continuous and uniform, at a rate of 25 sq ft/gal (0.6 sq m/L) per coat.
- I. Seal items watertight with mastic, that project through dampproofing surface.

END OF SECTION

**SECTION 071400
FLUID-APPLIED WATERPROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cold-applied rubberized asphalt waterproofing.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete substrate.
- B. Section 042000 - Unit Masonry: Masonry joints prepared to receive flashings.
- C. Section 072100 - Thermal Insulation: Insulation used for protective cover.
- D. Section 076200 - Sheet Metal Flashing and Trim: Metal parapet covers, copings, and counterflashings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.
- B. ASTM C1306/C1306M - Standard Test Method for Hydrostatic Pressure Resistance of a Liquid-Applied Waterproofing Membrane; 2008 (Reapproved 2023).
- C. ASTM D7877 - Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes; 2024.
- D. ASTM D8231 - Standard Practice for the Use of a Low Voltage Electronic Scanning System for Detecting and Locating Breaches in Roofing and Waterproofing Membranes; 2019.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- F. ICC-ES AC29 - Acceptance Criteria for Cold, Liquid-Applied, Below-Grade, Exterior Dampproofing and Waterproofing Materials; 2011, with Editorial Revision (2020).
- G. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.04 SUBMITTALS

- A. See Section 013000 - 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 Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Warranty Documentation:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until cured.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Installer Warranty: Provide 5-year warranty for waterproofing failing to resist penetration of water commencing on Date of Substantial Completion. Complete forms in Owner's name and register with installer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cold-Applied Rubberized Asphalt Waterproofing:
 - 1. EPRO Services, Inc; _____: www.eproinc.com/#sle.
 - 2. NaturaSeal; SpraySeal NS-F300+GE (Geotextile): www.naturaseal.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 FLUID-APPLIED WATERPROOFING APPLICATIONS

- A. Cold-Applied Rubberized Asphalt Waterproofing:
 - 1. Cover with protection board.

2.03 FLUID-APPLIED WATERPROOFING MATERIALS

- A. Cold-Applied Rubberized Asphalt Waterproofing: Rubberized asphaltic compound, suitable for installation on concrete and concrete masonry.
 - 1. Cured Thickness: 60 mil, 0.060 inch (1.52 mm), minimum.
 - 2. Water Vapor Permeance: 1 perm (57 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.

2.04 ACCESSORIES

- A. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.
- B. Brushed-On Coating: Cold-applied elastomeric coating that provides waterproofing, corrosion protection, and weather resistance.
 - 1. Coverage: Apply coating between 15 to 30 sq ft/gal (0.3 to 0.7 sq m/L) to produce at least 40 to 120 mil, 0.040 to 0.12 inch (1 to 3 mm) thick coating.
- C. Protection Board: Rigid insulation; see Section 072100.

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 substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
- D. Verify that items penetrating surfaces to receive waterproofing are securely installed.
- E. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- F. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent surfaces from damage not designated to receive waterproofing.
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- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
 - C. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.
 - D. Prepare building expansion joints at locations as indicated on drawings.
 - E. Install cant strips at inside corners.

3.03 INSTALLATION

- A. Install waterproofing to specified minimum thickness in accordance with manufacturers instructions and NRCA (WM) applicable requirements.
- B. Apply primer or surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.
- C. At joints and cracks less than 1/2 inch (13 mm) in width including joints between horizontal and vertical surfaces, apply 12 inch (300 mm) wide strip of joint cover sheet.
- D. Apply extra thickness of waterproofing material at corners, intersections, and angles.
- E. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.
- F. 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.

3.05 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing.
- C. Provide daily on-site attendance of waterproofing and insulation manufacturer's representative during installation of this work.
- D. Electronic Leak Detection (ELD) Testing: Test waterproofed areas for leaks using ELD method that locates discontinuities in fluid-applied waterproofing in accordance with ASTM D7877 or ASTM D8231.
 - 1. Testing agency to submit Daily Field Report (DFR) in accordance with ASTM D8231 indicating daily details of work performed.
 - 2. Testing agency to submit training certification to ensure that technician performing ELD testing is currently certified in accordance with relevant training program.

END OF SECTION

**SECTION 071900
WATER REPELLENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water repellents applied to exterior and interior, masonry, stone, and concrete surfaces.

1.02 REFERENCE STANDARDS

- A. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023a.
- B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2018).
- C. ASTM D5095 - Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments; 1991 (Reapproved 2022).
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

1.04 MOCK-UPS

- A. Prepare representative surface 36 by 36 inches (0.91 by 0.91 m) in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.
- B. Locate where directed.
- C. Mock-up may remain as part of work.

1.05 FIELD CONDITIONS

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F (10 degrees C) or higher than 100 degrees F (38 degrees C).

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acrylic Water Repellents:
 - 1. BASF Construction Chemicals; ____: www.buildingsystems.basf.com/#sle.
 - 2. Pittsburgh Paints; ____: www.ppgpaints.com/#sle.
 - 3. Sherwin-Williams Company; ____: www.sherwin-williams.com/#sle.

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4. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
1. Applications: Vertical surfaces and non-traffic horizontal surfaces.
 2. Number of Coats: Two.
 3. VOC Content: Less than 600 g/L, when tested in accordance with ASTM D3960 or ASTM D5095.
 4. Maintains dry appearance when wetted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.02 PREPARATION

- A. Protection of Adjacent Work:
1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
 2. Protect adjacent surfaces not intended to receive water repellent.
- B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
- C. Do not start work until masonry mortar substrate is cured a minimum of 60 days.
- D. Remove loose particles and foreign matter.
- E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.
- F. Scrub and rinse surfaces with water and let dry.
- G. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.03 APPLICATION

- A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
- B. Apply two coats, minimum.
- C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

END OF SECTION

**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, over roof deck, over roof sheathing, and exterior wall behind _____ wall finish.
- B. Batt insulation _____ in exterior and interior wall and ceiling construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
- B. Section 072700 - Air Barriers: Separate air barrier materials.
- C. Section 075400 - Thermoplastic Membrane Roofing: Installation requirements for board insulation over low slope roof deck.

1.03 REFERENCE STANDARDS

- A. ASTM C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations; 2023.
- B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- G. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2025.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- J. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024.
- K. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; 2021a.
- L. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Shop Drawings: Submit drawings that indicate location of joint or termination detail conditions.
- D. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- G. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- H. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
 - 1. Installer Qualification: Use accredited contractors, certified installers, evaluated materials, and third-party field quality control audit.
 - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- B. Insulation Inside Masonry Cavity Walls: Expanded polystyrene (EPS) board.
- C. Insulation in Wood Framed Walls: Batt insulation with no vapor retarder.
- D. Insulation in Wood Framed, Fire-Rated Floor-Ceiling Assemblies: Mineral Wool insulation with no vapor retarder.
- E. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.
- F. Insulation over Roof Deck: Polyisocyanurate board.
- G. Insulation in Wood Framed Roof Rafters where above ceiling insulation does not occur: Mineral Wool.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Expanded Polystyrene (EPS) Board Insulation: Comply with ASTM C578.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 4. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
 - 5. Board Thickness: 1-1/2 inch (38 mm).
 - 6. Board Edges: Square.

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7. Type and Compressive Resistance: Type XI, 5 psi (35 kPa), minimum.
 8. Type and Water Absorption: Type XI, 4.0 percent by volume, maximum, by total immersion.
 9. Type and Thermal Resistance, R-value (RSI-value): Type XI, 3.1 (0.55), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 10. Products:
 - a. Atlas Molded Products, a Division of Atlas Roofing Corporation; ThermalStar EPS Wall Insulation Board: www.atlasmoldedproducts.com/#sle.
 - b. Diversifoam Products; _____: www.diversifoam.com/#sle.
 - c. InsulFoam LLC; InsulFoam _____: www.insulfoam.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- B. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
- C. Extruded Polystyrene (XPS) Cavity Wall Insulation Board: Comply with ASTM C578, and manufactured using carbon black technology.
1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.6 (0.98), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 4. Board Size: 15-3/4 inch by 96 inch (400 mm by 2440 mm).
 5. Board Thickness: 1-3/4 inch (44.5 mm).
 6. Board Edges: Square.
 7. Products:
 - a. DuPont de Nemours, Inc; Styrofoam Brand Cavitymate Ultra: building.dupont.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- D. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
1. 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 1 - 16 psi (110 kPa), minimum.
 - 3) Thermal Resistance, R-value (RSI-value): At 1-1/2 inch (38.1 mm) thick; Class 1, Grades 1-2-3 - 8.4 (1.48), minimum, at 75 degrees F (24 degrees C).
 2. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
 3. Board Thickness: 1.5 inch (37.5 mm).
 4. Board Edges: Square.
 5. Products:
 - a. Atlas Roofing Corporation; EnergyShield CGF Pro Wall Insulation: www.atlasroofing.com/#sle.
 - b. Carlisle Coatings & Waterproofing, Inc; R2+ Matte: www.carlisleccw.com/#sle.
 - c. DuPont de Nemours, Inc; Thermax Light Duty NH: building.dupont.com/#sle.
 - d. Johns Manville; AP Foil-Faced: www.jm.com/#sle.
 - e. Substitutions: See Section 016000 - Product Requirements.
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2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Formaldehyde Content: Zero.
 - 3. Thermal Resistance: R-value as depicted on drawings (RSI-value) of ____ (____).
 - 4. Facing: Unfaced.
 - 5. Products:
 - a. CertainTeed Corporation; _____: www.certainteed.com/#sle.
 - b. Johns Manville; _____: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTough PINK FIBERGLASS Acoustic Batts Insulation: www.ocbuildingspec.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- B. 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. Thermal Resistance: Roof Rafters Min. R-Value = R-38
 - 4. Thermal Resistance: Floor-Ceiling Assembly Min. R-Value = R-30
 - 5. Products:
 - a. Johns Manville: www.jm.com/#sle.
 - b. ROCKWOOL: www.rockwool.com/#sle.
 - c. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- C. Mineral Fiber Enclosure for Recessed Ceiling Fixtures: Insulated box enclosure with foil facing on exterior side for placement over recessed ceiling light fixture; flame spread index of 25 or less, and smoke development index of 450 or less when tested in accordance with ASTM E84.
 - 1. Light Fixture Size: As indicated on drawings.
 - 2. Insulation Thickness: 1-1/4 inch (31.8 mm), nominal.
 - 3. Thermal Resistance: R-value (RSI-value) of 4.2 (0.74) per inch, minimum, at 75 degrees F (24 degrees C), minimum, when tested according to ASTM C518.

2.04 ACCESSORIES

- A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 - 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 - 2. Width: Are required for application.
- B. Self-Adhered Transition Flashing: Multipurpose, self-adhered flashing with modified butyl adhesive, polyester fiber top sheet, and polypropylene interlayer.
 - 1. Application: Primerless adhesion for use as through-wall flashings and wall transitions to roof and below-grade systems.
 - 2. Thickness: 45 mil, 0.045 inch (1.14 mm), nominal.
 - 3. Size: 6 inches (152 mm) wide, in rolls 75 feet (23 m) long.
- C. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
 - 1. Width: 3-1/2 inches (89 mm).
 - 2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.

-
- D. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

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. 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.
- B. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Adhere 6 inches (152 mm) wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
 - 1. Tape seal joints between sheets.
 - 2. Extend sheet full height of joint.
- B. Install boards horizontally on walls.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Install boards to fit snugly between wall ties.
- B. Install boards horizontally on walls.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
 - 1. See applicable roofing specification section for specific board installation requirements.
 - 2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
 - 3. Do not apply more insulation than can be covered with roofing on the same day.

3.06 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and ceiling 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

**SECTION 072500
WEATHER BARRIERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-resistive barriers.

1.02 RELATED REQUIREMENTS

- A. Section 076200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.03 DEFINITIONS

- A. Weather Barriers: Materials or assemblies forming water-resistive barriers, air barriers, vapor retarders, or combination of one or more assemblies.
- B. Water-Resistive Barriers: Materials or assemblies installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly.

1.04 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).
- B. ASTM D751 - Standard Test Methods for Coated Fabrics; 2019.
- C. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds; 1998 (Reapproved 2017).
- D. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2024.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- F. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- G. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; 2017, with Editorial Revision (2021).
- I. ICC-ES AC212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing; 2015, with Editorial Revision (2020).
- J. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

1.06 MOCK-UPS

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Locate where directed.

1.07 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIERS

- A. Description: Materials installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly. Primary materials include mechanically applied sheets; accessory materials include flashings and seam tapes.
- B. Regulatory Requirements: For use in ICC (IBC) construction Types I, II, III, and IV buildings greater than 40 feet (12.2 m) in height.
 - 1. Comply with NFPA 285 wall assembly requirements in accordance with local building code and authorities having jurisdiction (AHJ).
- C. Water-Resistive Barrier Coating: Fluid-applied air and water-resistive coating for various exterior substrates.
 - 1. Air Permeance, Building Assembly Air Leakage Rate: Not greater than 0.04 cfm/sq ft (0.2 L/sq m) when tested at 1.57 psf (75 Pa) in accordance with ASTM E2357.
 - 2. Air Permeance, Building Material Air Leakage Rate: 0.004 cfm/sq ft (0.02 L/sec sq m) maximum leakage when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E2178.
 - 3. Water-Resistive Barrier over Sheathing Compliance: Complying with ICC-ES AC212.
 - 4. Water Vapor Permeance: Tested in accordance with ASTM E96/E96M.
 - a. Procedure A: Greater than 5 perms (287 ng/(Pa s sq m)).
 - b. Procedure B: Greater than 14 perms (804 ng/(Pa s sq m)).
 - 5. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 120 days of weather exposure.
 - 6. System Accessory Products: As recommended by coating manufacturer.
 - 7. Products:
 - a. LATICRETE International, Inc: www.cdn.laticrete.com/#sle.
 - b. Tremco; www.tremcosealants.com/
 - c. PROSOCO, Inc; Spray Wrap MVP : www.prosoco.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.

2.02 ACCESSORIES

- A. Seal and Perimeter Tapes: As recommended by water-resistive barrier manufacturer.
- B. Flashings and Sealants: As recommended by water-resistive barrier manufacturer for application.
- C. Metal Flashings: See Section 076200.
- D. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and weather barrier materials.
 - 1. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch (0.76 to 1.02 mm) nominal thickness.
 - 2. Color: _____.
 - 3. Elongation: 1,300 percent, measured in accordance with ASTM D412.
 - 4. Peel Adhesion: 28 lb/inch (5.0 kg/cm), minimum, when tested in accordance with ASTM D903.
 - 5. Hydrostatic Head Pressure: Resist head pressure of 57 feet (17.4 m), maximum, when tested in accordance with ASTM D751.
- E. Flexible Flashing: Self-adhering or mechanically attached flashing used for wall penetrations in accordance with ICC-ES AC148 requirements.
- F. Liquid Flashing: One part, fast curing, nonsag, elastomeric, gun grade, trowelable liquid flashing.

1. Products:
 - a. Dow: www.dow.com/#sle.
 - b. Pecora Corporation: www.pecora.com/#sle.
 - c. W. R. Meadows, Inc: www.wrmeadows.com/#sle.
 - d. Prosoco, R-Guard: <https://prosoco.com/>.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions comply with requirements of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Fluid-Applied Membranes:
 1. Prepare substrate in accordance with coating manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
 2. Apply flashing to seal with adjacent construction and to bridge joints in coating substrate.
- C. Openings and Penetrations in Exterior Water-Resistive Barriers:
 1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches (127 mm) onto water-resistive barrier and at least 6 inches (152 mm) up jambs; mechanically fasten stretched edges.
 2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
 3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
 4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches (50 mm) beyond face of jambs; seal water-resistive barrier to flashing.
 5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
 6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Owner's Inspection and Testing: Cooperate with Owner's testing agency.
 1. Allow access to work areas and staging.
 2. Notify Owner's testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection.
 3. Do not cover work of this section until testing and inspection is accepted.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

**SECTION 074113
METAL ROOF PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preformed steel panels.
- B. Attachment system.
- C. Secondary framing.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Roof sheathing.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. 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 A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2025.
- F. 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; 2023.
- G. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- H. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing; 2016a (Reapproved 2021).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- J. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
- K. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2018).
- L. ASTM E1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems; 2016 (Reapproved 2022).
- M. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2023.
- N. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.

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- C. Shop Drawings: Indicate 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.
 - 2. Include structural analysis signed and sealed by qualified structural engineer, indicating compliance of roofing system to specified loading conditions.
 - D. Samples: For each roofing system specified, submit samples of minimum size 12 inches (305 mm) square, representing actual roofing metal, thickness, profile, color, and texture.
 - 1. Include typical fastening detail.
 - E. Test Reports: Indicate compliance of metal roofing system with specified requirements.
 - F. Manufacturer's qualification statement.
 - G. Installer's qualification statement.
 - H. Specimen warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least five years of documented experience.

1.06 MOCK-UPS

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Provide mock-up of 8 sq ft (___ sq m), including underlayment, eave protection membrane, associated flashings, and to be part of masonry and ACM panel mock up.
- C. Locate as directed by Architect.
- D. Mock-up may not remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- C. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Special Warranty: Provide 20-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.
- C. Finish Warranty: Provide 35-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.
 - 1. Warranty Coverage: In accordance with AAMA 611 Class 1 anodized aluminum finish requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Metal Roof Panel Manufacturers:
 - 1. Basis of Design: Petersen Aluminum Corporation; Tite-Loc Plus Panel: www.pac-clad.com/#sle.
 - 2. Substitutions as or equal only: See Section 016000 - Product Requirements.

- B. Metal Soffit Panel Manufacturers:
 - 1. Basis of Design: Petersen Aluminum Corporation; Flush Soffit: www.pac-clad.com/#sle.
 - 2. Substitutions as or equal only: See Section 016000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
 - 1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length (L) when tested in accordance with ASTM E1592.
 - a. Dead Loads: Weight of roofing system.
 - b. Live Loads: As required by ASCE 7.
 - 2. System Performance: Complete and weathertight; tested and approved in accordance with ASTM E1592.
 - 3. Wind Uplift: 120 MPH wind uplift resistance.
 - 4. Air Infiltration: Maximum 0.06 cfm/sq ft (0.3 L/sec sq m) at air pressure differential of 6.24 lbf/sq ft (300 Pa), when tested in accordance with ASTM E1680.
 - 5. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
 - 6. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

2.03 METAL ROOF PANELS

- A. Description: 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: Preformed panels with factory-applied finish from manufacturers full line.
 - 1. Steel Panels:
 - a. Steel Thickness: Minimum 22 gauge, .0299 inch (___ mm).
 - 2. Profile: Standing seam, with minimum 1-1/2-inch (38 mm) seam height; concealed fastener system for field seaming with special tool.
 - 3. Texture: Smooth.
 - 4. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so each sheet spans over three or more supports.
 - 5. Width: Maximum panel coverage of 18 inches (457 mm).
- C. Metal Soffit Panels:
 - 1. Profile: Style as indicated, with venting provided.
 - 2. Material: Precoated steel sheet, 22 gauge, 0.0299 inch (0.76 mm) minimum thickness.
 - 3. Perforation Pattern: As selected by Architect from manufacturer's standard line.
 - 4. Color: As selected by Architect from manufacturer's full line.

2.04 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 SECONDARY FRAMING

- A. Miscellaneous Framing: Light gauge steel framing incidental to structural supports; fabricated from steel sheet.

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- B. Material: ASTM A1011/A1011M Designation SS steel sheet.
 - 1. Profile: Manufacturer's standard cee, zee, asymmetrical zee, hat channel, plain channel, single slope eave strut, double slope eave strut, and angle.
 - 2. Thickness: 12 gauge, 0.1046 inch (2.657 mm).
 - 3. Finish: Galvanized in accordance with ASTM A653/A653M G90.
 - C. Connectors: Factory-made formed steel sheet, ASTM A653/A653M SS Grade 50, with G60/Z180 hot-dipped galvanized coating and factory-punched holes.

2.06 FABRICATION

- A. Panels: Provide factory-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.

2.07 FINISHES

- A. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat metal coil-coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (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 (0.023 mm); color and gloss to match sample.
- B. Solar Reflectance Index (SRI): 82, initial, less than 2:12 low-sloped roof.
- C. Color: As selected by Architect from manufacturer's full range.
- D. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.08 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.
 - 1. Downspouts: Open face, rectangular profile.
- 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 Applications: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Applications: Noncuring butyl or tape sealant.
 - 3. Seams: Factory-applied, nonskinning, nondrying type.
- D. Thermal Insulation: Provide rigid type, faced with white, flexible, nondusting vapor retarder tested for maximum flame spread index of 50, in accordance with ASTM E84; for installation using spacer blocks.
 - 1. Thickness: As indicated.
- E. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil (1.02 mm) total thickness; with strippable release film and polyolefin top surface with anti-skid coating.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for self-adhesive sheet.
 - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 3. Low-Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.

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4. Liquid Water Transmission: Passes ASTM D4869/D4869M.
 5. Product:
 - a. Basis of Design: Petersen Aluminum Corporation; PAC-CLAD HT.
 - b. Substitutions as an or equal: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates are properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Broom clean wood sheathing prior to installation of roofing system.
- B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure completed roof will be free of leaks.
- C. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.
- D. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.
- E. At locations 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. Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place, 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 required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.
- B. Accessories: Install necessary components required for 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 metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.
- D. Insulation: Install insulation between roof covering and supporting members to present a neat appearance; fold, staple, and tape seams unless otherwise approved by Architect.

3.04 CLEANING

- A. See Section 017000 - Execution and Closeout Requirements for additional requirements.
- B. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to 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 074213.23
METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.
- B. Matching flashing and trim.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Installation of anchors.
- B. Section 042000 - Unit Masonry: Installation of anchors.
- C. Section 072500 - Weather Barriers: Water-resistive barrier behind wall panel system.
- D. Section 076200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.
- E. Section 079200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2021).
- F. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2023.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- H. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
 - 1. Finish manufacturer's data sheet showing physical and performance characteristics.
 - 2. Storage and handling requirements and recommendations.
 - 3. Fabrication instructions and recommendations.

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4. Specimen warranty for finish, as specified herein.
- C. Product Data - Wall System: 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.
 4. Specimen warranty for wall system, as specified herein.
 - D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, exposed fasteners, number of anchors, supports, reinforcement, trim, flashings, and accessories.
 1. Indicate panel numbering system.
 2. Differentiate between shop and field fabrication.
 3. Indicate substrates and adjacent work with which the wall system must be coordinated.
 4. Include large-scale details of anchorages and connecting elements.
 5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10).
 6. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
 - E. Selection Samples: For each finish product specified, submit at least two sample color chips representing manufacturer's standard range of available colors and patterns.
 1. Sealant Color: Color to match wall panels.
 - F. Certificate: Certify that the work results of this section meet or exceed specified requirements.
 - G. Design Data: Submit structural calculations stamped by design engineer, for Architect's information and project record.
 - H. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.
 - I. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
 - J. Designer's qualification statement.
 - K. Manufacturer's qualification statement.
 - L. Testing agency's qualification statement.
 - M. Maintenance Data: Care of finishes and warranty requirements.
 - N. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - O. 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.

1.05 QUALITY ASSURANCE

- A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.

- D. Testing Agency Qualifications: Independent agency experienced in testing assemblies of the type required for this project and having the necessary facilities for full-size mock-up testing of the type specified.

1.06 MOCK-UPS

- A. Provide a mock-up for evaluation of fabrication workmanship.
- B. Locate where directed.
- C. Provide specified finish on panels.
- D. Mock-up may not remain as part of work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - 1. Protect finishes by applying heavy-duty removable plastic film during production.
 - 2. Package for protection against transportation damage.
 - 3. Provide markings to identify components consistently with drawings.
 - 4. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting, and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in well-ventilated space out of direct sunlight.
 - 2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
 - 3. Store at a slope to ensure positive drainage of accumulated water.
 - 4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
 - 5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.08 FIELD CONDITIONS

- A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Special Warranty: Provide 5-year warranty covering water tightness and integrity of seals of wall panels. Complete forms in Owner's name and register with warrantor.
- C. 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 Composite Material (MCM) Sheet Manufacturers:
 - 1. ALUCOBOND by 3A Composites USA; ALUCOBOND PLUS: www.alucobondusa.com/#sle.
 - 2. Alfrex, LLC; Alfrex fr: www.alfrexusa.com/#sle.
 - 3. ALPOLIC Materials; ALPOLIC/fr (Fire Retardant core): www.alpolic-america.com/#sle.

2.02 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage, or failure.
1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.
 2. Provide panel jointing and weatherseal using a "wet", sealant-sealed system.
 3. Anchor panels to supporting framing without exposed fasteners.

2.03 PERFORMANCE REQUIREMENTS

- A. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
1. Wind Performance: Provide system tested in accordance with ASTM E330/E330M without permanent deformation or failures of structural members under the following conditions:
 2. Inward Design Wind Pressure: ___ psf (___ kPa).
 3. Outward Design Wind Pressure: ___ psf (___ kPa).
 4. Maximum deflection of perimeter framing member of L/175 normal to plane of the wall; maximum deflection of individual panels of L/60.
 5. Maximum anchor deflection in any direction of 1/16 inch (1.6 mm) at connection points of framing members to anchors.

2.04 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
1. Overall Sheet Thickness: 0.118 inch (3 mm), minimum.
 2. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch (100 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 3. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 4. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater when tested in accordance with ASTM D1929.
- B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
1. Provide material strength, dimensions, configuration as required to meet applied loads and in compliance with applicable building code.

2.05 FINISHES

- A. Finish: Factory finished highly polished Class I natural anodized finish; AAMA 611 AA-M12C22A41, anodic coating not less than 0.7 mil, 0.0007 inch (0.018 mm) thick.
- B. Color/Texture: As selected by Architect from manufacturer's full range. Basis of Design color is Alucobond Bone White.

2.06 ACCESSORIES

- A. Flashing: Sheet stainless steel; 0.040 inch (1.0 mm) thick, minimum; finish and color to match MCM sheet; see Section 076200 for additional requirements.
- B. Support for Cladding and Continuous Insulation: Thermal clips.
 - 1. Thermally-broken clips that provide attachment support for girts, angles, channels, and other cladding support framing.
 - 2. Clip Depth: As required for thickness of insulation.
 - 3. Spacing of Clips: 16 inches (406 mm) on center, vertically.
 - 4. Fasteners: As recommended by clip manufacturer.
- C. Fasteners:
 - 1. Exposed Fasteners: Stainless steel; permitted only where absolutely unavoidable and subject to prior approval of the Architect.
 - 2. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
 - 3. Bolts: Stainless steel.
 - 4. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine dimensions, tolerances, and interfaces with other work.
- B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- G. Where joints are designed for field-applied sealant, seal joints completely with specified sealant.

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- H. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
 - I. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
 - 1. Variation From Plane or Location: 1/2 inch in 30 feet (10 mm in 10 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
 - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.
 - J. Replace damaged products.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.
- C. Site Visits: Schedule two site visits during execution of installation.

3.04 CLEANING

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 075423
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mechanically attached thermoplastic polyolefin (TPO) roofing membrane.
- B. Adhered system with thermoplastic polyolefin (TPO) roofing membrane.
- C. Insulation, tapered.
- D. Vapor retarder.
- E. Deck sheathing.
- F. Roofing cant strips, roofing expansion joints, and walkway pads.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2024.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2025.
- D. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2022, with Editorial Revision (2023).
- E. ASTM D6163/D6163M - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements; 2021.
- F. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing; 2021.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- H. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).
- I. FM DS 1-28 - Wind Design; 2015, with Editorial Revision (2024).
- J. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; 2016, with Editorial Revision (2022).
- K. NRCA (RM) - The NRCA Roofing Manual; 2025.
- L. NRCA (WM) - The NRCA Waterproofing Manual; 2021.
- M. UL (FRD) - Fire Resistance Directory; Current Edition.
- N. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's written information listed below.
 - 1. Product data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
 - 2. Preparation instructions and recommendations.

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- 3. Storage and handling requirements.
 - C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout.
 - D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
 - F. Warranty:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.
 - G. Manufacturer's Qualification Statement.
 - H. Installer's Qualification Statement.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Protect products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Provide Safety Data Sheets (SDS) at the project site at all times during transportation, storage, and installation of materials.
- E. Comply with requirements from Owner to prevent overloading or disturbance of the structure when loading materials onto the roof.

1.05 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F (5 degrees C) or above ___ degrees F (___ degrees C).
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.
- F. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 10 years after installation.
- C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 - 1. Warranty Term: 30 years.
 - 2. For repair and replacement include costs of both material and labor in warranty.

3. Include accidental punctures according to the manufacturer's standard warranty terms.
4. Include hail damage according to the manufacturer's standard warranty terms.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Carlisle SynTec Systems: www.carlisle-syntec.com/#sle.
- B. GAF: <https://www.gaf.com/>
- C. Johns Manville: <https://www.jm.com/>
- D. Substitutions: See Section 016000 - Product Requirements.

2.02 ROOFING APPLICATIONS

- A. TPO Membrane Roofing: One ply membrane, asphalt adhered, over insulation.
- B. Roofing Assembly Performance Requirements and Design Criteria:
 1. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value.
 - a. Calculate SRI in accordance with ASTM E1980.
 - b. Field applied coating may not be used to achieve specified SRI.
 2. Roof Covering External Fire Resistance Classification: Class A when tested per UL 790.
 3. Wind Uplift:
 - a. Designed to withstand wind uplift forces calculated with ASCE 7.
 - b. Design Wind Speed: In accordance with local building code and authorities having jurisdiction (AHJ).
 4. Insulation Thermal Resistance (R-Value): Provide R-Value over entire roof deck in accordance with local building code requirements.
 5. Drainage: No standing water within 48 hours after precipitation.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Single Source Responsibility: Provide and install products from single source.
- B. Base Sheet: ASTM D6163/D6163M, Type I, Grade S, glass-fiber reinforced, modified SBS sheet.
- C. Membrane:
 1. Material: Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
 2. Reinforcing: Internal fabric.
 3. Thickness: 60 mil (0.060 inch) (1.5 mm), minimum.
 4. Sheet Width: Factory fabricated into largest sheets possible.
 5. Color: White.
 6. Products:
 - a. Carlisle SynTec Systems; Sure-Weld.
- D. Seaming Materials: As recommended by membrane manufacturer.
- E. Membrane Fasteners: As recommended and approved by membrane manufacturer.
- F. Flexible Flashing Material: Same material as membrane.
- G. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Deck Sheathing and Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/2 inch (13 mm) thick.

2.05 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Complies with ASTM C1289, Type II, Class 1 - Faced with glass-reinforced felt on both surfaces of core foam.
 - 1. Tapered Board: Slope as indicated; minimum thickness 1/2 inch (13 mm); fabricate of fewest layers possible.
 - 2. Grade and Compressive Strength: Grade 2, 20 psi (Grade 2, 138 kPa), minimum.
 - 3. Board Thickness: 4 inches (102 mm).
 - 4. Product: Carlisle InsulBase.
 - 5. Total R-Value = R-25

2.06 ACCESSORIES

- A. Prefabricated Flashing Accessories:
 - 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
 - 2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
 - 3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
 - 4. Pressure Sensitive Cover Strips: 6 inches (152 mm) wide, 45 mil, 0.045 inch (1.1 mm) thick, non-reinforced TPO membrane laminated to 35 mil, 0.035 inch (0.9 mm) thick cured synthetic rubber with pressure sensitive adhesive.
 - 5. Miscellaneous Flashing: Non-reinforced TPO membrane; 80 mil, 0.080 inch (2.0 mm) thick, in manufacturer's standard lengths and widths.
- B. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches (150 mm) wide; self adhering.
- C. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
 - 1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- D. Membrane Adhesive: As recommended by membrane manufacturer.
 - 1. Carlisle SynTec Systems; Sure-Weld Bonding Adhesive.
 - 2. Product:
- E. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- F. Sealants: As recommended by membrane manufacturer.
 - 1. Product:
- G. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
 - 1. Product: Carlisle Weathered Membrane Cleaner.
- H. Edgings and Terminations: Manufacturer's standard edge and termination accessories.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.

- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION, GENERAL

- A. Clean substrate thoroughly prior to roof application.
- B. Do not begin work until other work that requires foot or equipment traffic on roof is complete.
- C. Apply manufacturer's recommended vapor retarder or temporary roof before roof installation.

3.03 METAL DECK PREPARATION

- A. Install preformed sound absorbing glass fiber insulation strips supplied by Section 053100 in acoustic deck flutes. Install in accordance with manufacturer's instructions.
- B. Install deck sheathing on metal deck:
 - 1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
 - 2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
 - 3. Tape joints.
 - 4. Mechanically fasten sheathing to roof deck, in accordance with Factory Mutual recommendations and roofing manufacturer's instructions.
 - a. Over entire roof area, fasten sheathing using 6 fasteners with washers per sheathing board.

3.04 INSTALLATION - GENERAL

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.
- G. When substrate preparation is responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

3.05 INSULATION APPLICATION

- A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
 - 1. Extend vapor retarder under cant strips and blocking to deck edge.
 - 2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.
- B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.
- C. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions.
- D. Lay subsequent layers of insulation with joints staggered minimum 6 inch (152 mm) from joints of preceding layer.

- E. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- F. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch (6.3 mm). Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- G. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- H. Do not apply more insulation than can be completely waterproofed in the same day.

3.06 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Asphalt Adhered Application: Apply asphalt at manufacturer's recommended rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
 - 1. Seam Welding: Overlap edges and ends and seal seams by heat welding, minimum 2 inches (51 mm).
 - 2. Cover seams with manufacturer's recommended joint covers.
 - 3. Probe seams once welds have thoroughly cooled, in approximately 30 minutes.
 - 4. Repair deficient seams within the same day.
 - 5. Seal cut edges of reinforced membrane after seam probe is complete.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches (100 mm) onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Coordinate installation of roof drains and sumps and related flashings. Locate all field splices away from low areas and roof drains. Lap upslope sheet over downslope sheet.
- G. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.07 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers twice weekly during installation of this Work.

3.08 CLEANING

- A. See Section 017000 - Execution and Closeout Requirements for additional requirements.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

3.09 PROTECTION

- A. Protect installed roofing and flashings from construction operations.

- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

**SECTION 076200
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, exterior penetrations, and _____.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- H. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- I. CDA A4050 - Copper in Architecture - Handbook; Current Edition.
- J. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with _____ years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sheet Metal Flashing and Trim:

1. Petersen Aluminum Corporation; _____: www.pac-clad.com/#sle.
 2. Substitutions: See Section 016000 - Product Requirements.
- B. Exterior Penetration Flashing Panel:
1. Quickflash Weatherproofing Products, Inc; _____: www.quickflashproducts.com/#sle.
 2. Substitutions: See Section 016000 - Product Requirements.

2.02 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch (1.02 mm) thick; plain finish shop pre-coated with silicone modified polyester coating.
1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; pretreated metal with two-coat system including primer and color coat with at least 70 percent PVDF coating.
 2. Color: As selected by Architect from manufacturer's full colors.
- B. Stainless Steel: ASTM A666/A666M, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch (0.40 mm) thick; smooth No. 4 - Brushed finish.

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 (13 mm); 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 (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

2.04 GUTTERS, SCUPPER AND DOWNSPOUTS

- A. Gutters: SMACNA (ASMM) Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Accessories: Profiled to suit gutters and downspouts.
1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
 2. Downspout Supports: Brackets.
- D. Downspout Boots: Cast iron.
- E. Scuppers as indicated on drawings.
- F. Seal metal joints.

2.05 FLASHING

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.06 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- 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. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.
 - F. Reglets: Surface-mounted type, galvanized steel; face and ends covered with plastic tape.

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.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

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.
- D. Secure gutters and downspouts in place with concealed fasteners.
- E. Connect downspouts to downspout boots, and grout connection watertight.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

**SECTION 077100
ROOF SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including copings, fascias, and gravel stops.

1.02 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- E. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.
- F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- G. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- H. NRCA (RM) - The NRCA Roofing Manual; 2025.
- I. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. See Section 013000 - 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. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roof Edge Flashings and Copings:
 - 1. Peterson Metals; <https://www.pac-clad.com/>
 - 2. Architectural Products Co; _____: www.archprod.com/#sle.
 - 3. ATAS International, Inc; Drip Edge Fascia: www.atas.com/#sle.
 - 4. Metal Roofing Systems, Inc; Rapid Lock Coping: www.metalroofingsystems.biz/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Pipe and Penetration Flashings:
 - 1. Elmdor; _____: www.elmdor.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.

- C. Counterflashings:
 - 1. ATAS International, Inc; ____: www.atas.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- D. Pipe Penetration Wall Seal:
 - 1. Airex Manufacturing, Inc; Airex Titan Outlet: www.airexmfmg.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
 - 1. Configuration: Fascia, cant, and edge securement for roof membrane.
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code.
 - 3. Exposed Face Height: As indicated on drawings.
 - 4. Material: Extruded aluminum, 0.08 inch (2.0 mm) thick, minimum.
 - 5. Finish: 70 percent polyvinylidene fluoride.
 - 6. Color: As selected by Architect from manufacturer's full range.

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.
- C. Insulation Board Adhesive: Two-component, low-rise polyurethane foam adhesive used for adhering insulation to low slope roof deck materials.

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.

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. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- D. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.
- E. Coordinate installation of flashing flanges into reglets.

END OF SECTION

**SECTION 077200
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof curbs.
- B. Roof penetrations mounting curbs.

1.02 RELATED REQUIREMENTS

- A. Section 077100 - Roof Specialties: Other manufactured roof specialty items.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926.502 - Fall protection systems criteria and practices; Current Edition.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2025.
- D. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- E. UL (DIR) - Online Certifications Directory; Current Edition.
- F. UL 793 - Automatically Operated Roof Vents for Smoke and Heat; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty for _____. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 ROOF CURBS

- A. Roof Curbs Manufacturers:
 - 1. AES Industries Inc; _____: www.aescurb.com/#sle.
 - 2. MKT Metal Manufacturing; _____: www.mktduct.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
 - 1. Roof Curb Mounting Substrate: Curb substrate consists of standing seam metal roof panel system.
 - 2. Sheet Metal Material:
 - a. Aluminum: 0.080 inch (2.03 mm) minimum thickness, with 3003 alloy, and H14 temper.
 - 1) Finish: Mill finish.
 - 2) Color: As selected by Architect from manufacturer's standard line of colors.
 - 3. Fabricate curb bottom and mounting flanges for installation directly on metal roof panel system to match slope and configuration of system.
 - a. Extend side flange to next adjacent roof panel seam and comply with seam configurations and seal connection, providing at least 6 inch (152 mm) clearance between curb and metal roof panel flange allowing water to properly flow past curb.
 - b. Where side of curb aligns with metal roof panel flange, attach fasteners on upper slope of flange to curb connection allowing water to flow past below fasteners, and seal connection.
 - c. Maintain at least 12 inch (305 mm) clearance from curb, and lap upper curb flange on underside of down sloping metal roof panel, and seal connection.
 - d. Lap lower curb flange overtop of down sloping metal roof panel and seal connection.
 - 4. Provide layouts and configurations indicated on drawings.

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 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

**SECTION 078400
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.

1.02 REFERENCE STANDARDS

- A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- C. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.
- E. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2024.
- F. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2024.
- G. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus; 2025.
- H. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023a, with Editorial Revision (2024).
- I. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- J. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- K. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products; _____: www.3m.com/firestop/#sle.
 - 2. Hilti, Inc; _____: www.hilti.com/#sle.
 - 3. MarinoWARE; _____: www.marinoware.com/#sle.

4. Specified Technologies Inc; _____: www.stifirestop.com/#sle.
5. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: www.tremcosealants.com/#sle.
6. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- C. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
- B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
- C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
- E. Acoustically Rated Firestopping: Provide system tested in accordance with ASTM E90 with STC rating of 50, minimum.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Caulk or putty.
 1. Fire Ratings: Use system that is listed by UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.
 2. Fire Ratings: See drawings for required systems and ratings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.
- C. Do not cover installed firestopping until inspected by authorities having jurisdiction.

- D. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

**SECTION 079200
JOINT SEALANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- C. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
- H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.
- I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- J. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- K. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- L. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include 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.
 - 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. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver sufficient samples to manufacturer for testing.
 - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Nonsag Sealants:
 - 1. Henry Company; _____: www.henry.com/#sle.
 - 2. Pecora Corporation; _____: www.pecora.com/#sle.
 - 3. Sherwin-Williams Company; _____: www.sherwin-williams.com/#sle.
 - 4. Sika Corporation; _____: www.usa.sika.com/#sle.
 - 5. Tremco Commercial Sealants & Waterproofing; _____: www.tremcosealants.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints:
 - a. Do not seal exterior joints unless indicated on drawings as sealed.
 - b. Seal the following joints:
 - 1) Wall expansion and control joints.
 - 2) Joints between doors, windows, and other frames or adjacent construction.
 - 3) Joints between different exposed materials.
 - 2. Interior Joints:
 - a. Do not seal interior joints indicated on drawings as not sealed.
 - b. Do not seal gaps and openings in suspended ceilings
 - c. Do not seal through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - d. Seal the following joints:
 - 1) Joints between door frames and window frames and adjacent construction.
 - 2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.
 - 3. Do Not Seal:

- a. Intentional weep holes in masonry.
- b. Joints indicated to be covered with expansion joint cover assemblies.
- c. Joints where sealant installation is specified in other sections.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 016116.
- B. Colors: As selected by the Architect.

2.04 NONSAG JOINT SEALANTS

- A. Nonstaining 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 25 percent, minimum.
 - 2. Nonstaining to Porous Stone: Nonstaining to light-colored _____ 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 full range.

2.05 ACCESSORIES

- A. Sealant Backing Rod, Closed-Cell Type:
 - 1. Cylindrical flexible sealant backings complying with ASTM C1330 Type C.
 - 2. Size: 25 to 50 percent larger in diameter than joint width.
 - 3. Products:
 - a. Nomaco, Inc; HBR: www.nomaco.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- 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, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

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.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. 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.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

**SECTION 081113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Fire-rated hollow metal doors and frames.
- D. Thermally insulated hollow metal doors with frames.
- E. Sound-rated hollow metal doors and frames.
- F. Hollow metal borrowed lites glazing frames.
- G. Accessories, including glazing and louvers.

1.02 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.
- B. Section 088000 - Glazing: Glass for doors and borrowed lites.
- C. Section 099113 - Exterior Painting: Field painting.
- D. Section 099123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2019.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
- D. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.
- E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- H. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- J. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- K. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

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- N. ASTM E413 - Classification for Rating Sound Insulation; 2022.
 - O. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
 - P. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
 - Q. ITS (DIR) - Directory of Listed Products; Current Edition.
 - R. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames; 2012.
 - S. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
 - T. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
 - U. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.
 - V. NAAMM HMMA 850 - Fire-Rated Hollow Metal Doors and Frames; 2014.
 - W. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; 2018.
 - X. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
 - Y. NAAMM HMMA 865 - Guide Specifications for Sound Control Hollow Metal Door and Frame Assemblies; 2013.
 - Z. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
 - AA. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
 - BB. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.
 - CC. UL (DIR) - Online Certifications Directory; Current Edition.
 - DD. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
 - EE. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

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. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.
 - 2. Fleming Door Products, an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.
 - 3. Premier Steel Doors and Frames; F Series Commercial Frames: www.trustpremier.com/#sle.
 - 4. Republic Doors, an Allegion brand; _____: www.republicdoor.com/#sle.
 - 5. Steelcraft, an Allegion brand; _____: www.allegion.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Sound-Rated Hollow Metal Doors and Frames:
 - 1. AMBICO Limited; _____: www.ambico.com/#sle.
 - 2. De La Fontaine; STC - Acoustical Core: www.delafontaine.com/#sle.
 - 3. Overly Door Company; _____: www.overly.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Manufacturers standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
 - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.

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- B. Exterior Doors: Thermally insulated.
 - 1. Based on NAAMM HMMA Custom Guidelines:
 - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
 - b. Performance Level 3 - Heavy Duty, in accordance with NAAMM HMMA 805.
 - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
 - 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 - 3. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
 - 4. Weatherstripping: Integral, recessed into door edge or frame.
 - 5. Door Finish: Factory primed and field finished.
 - C. Interior Doors, Non-Fire-Rated:
 - 1. Based on NAAMM HMMA Custom Guidelines:
 - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
 - b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
 - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
 - 2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
 - 3. Door Face Sheets: Flush.
 - 4. Door Finish: Factory primed and field finished.
 - D. Fire-Rated Doors:
 - 1. Based on NAAMM HMMA Custom Guidelines: Comply with NAAMM HMMA 850 requirements for fire-rated doors.
 - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
 - b. Performance Level 3 - Heavy Duty, in accordance with NAAMM HMMA 805.
 - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
 - 2. Fire Rating: As indicated on drawings, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 - 4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
 - 5. Door Face Sheets: Flush.
 - 6. Door Finish: Factory primed and field finished.
 - E. Sound-Rated Interior Doors:
 - 1. Based on NAAMM HMMA Custom Guidelines:
 - a. Comply with guidelines of NAAMM HMMA 865 for Sound Control Hollow Metal Doors and Frames.
 - b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
 - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - d. Door Face Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
 - 2. Sound Transmission Class (STC) Rating of Door and Frame Assembly: STC of 39, minimum, calculated in accordance with ASTM E413, and tested in accordance with ASTM E90.
 - 3. Door Core Material: Manufacturer's standard construction as required to meet acoustic requirements indicated.
 - 4. Door Thickness: As required to meet acoustic requirements indicated.
 - 5. Door Face Sheets: Flush.
 - 6. Door Finish: Factory primed and field finished.
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7. Sound Seals: Integral, in door and/or frame.
8. Opening Force of Sound-Rated Doors, Non-Fire-Rated: 5 pounds (22.2 N), maximum, in compliance with ADA Standards.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 2. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
 3. Weatherstripping: Separate, see Section 087100.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.
 2. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
 1. Fire Rating: Same as door, labeled.
 2. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.
 3. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
- F. Sound-Rated Door Frames: Knock-down type.
 1. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
- G. Commercial and/or Detention Security-Resistant Door Frames: With same security resistance as door; face welded or full profile/continuously welded construction, ground smooth, fully prepared and reinforced for hardware installation.
 1. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch (0.4 mm) dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
 1. Fire-Rated Frames: Comply with fire rating requirements indicated.

2.06 ACCESSORIES

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
 1. Size: As indicated on drawings.
 2. Frame Material: 18 gauge, 0.0478 inch (1.21 mm), galvanized steel.
 3. Metal Finish: Dark Bronze polyester powder coating.
 4. Glazing: 1/4 inch (6.4 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
- B. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches (102 mm) as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

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- C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 087100.
- F. Touch up damaged factory finishes.

3.03 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.

END OF SECTION

**SECTION 081213
HOLLOW METAL FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal frames for non-hollow metal doors.
- B. Fire-rated hollow metal frames for non-hollow metal doors.

1.02 RELATED REQUIREMENTS

- A. Section 081416 - Flush Wood Doors: Non-hollow metal door for hollow metal frames.
- B. Section 087100 - Door Hardware: Hardware, silencers, and weatherstripping.
- C. Section 088000 - Glazing: Glazed borrowed lites.
- D. Section 099113 - Exterior Painting: Field painting.
- E. Section 099123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022.
- B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- J. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- K. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- M. ITS (DIR) - Directory of Listed Products; Current Edition.
- N. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- O. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- Q. UL (DIR) - Online Certifications Directory; Current Edition.
- R. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Frames:
 - 1. Ceco Door, an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.
 - 2. Republic Doors, an Allegion brand; _____: www.republicdoor.com/#sle.
 - 3. Steelcraft, an Allegion brand; _____: www.allegion.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Hollow Metal Frames: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific frame type:
 - 1. Performance Class (PC): CW.
 - 2. Performance Grade (PG): 40, with minimum design pressure (DP) of 40.0 psf (40, with minimum design pressure (DP) of 1920 Pa).
- B. Door Frame Type: Provide hollow metal door frames with integral casings.
 - 1. Exterior Doors: Use frames with integral casings.
 - 2. Interior Doors: Use frames with integral casings.
- C. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
- D. Accessibility: Comply with ICC A117.1 and ADA Standards.
- E. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior frame that is also indicated as being sound-rated must comply with the requirements specified for exterior frames and for sound-rated frames; where two requirements conflict, comply with the most stringent.
- F. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115, NAAMM HMMA 830, NAAMM HMMA 831 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- G. Zinc Coating for Units Subject to Corrosive Conditions: Components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise.
- H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

2.03 HOLLOW METAL DOOR FRAMES WITH INTEGRAL CASINGS

- A. Frame Finish: Factory primed and field finished.
- B. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
 - d. Zinc Coating: Manufacturer's standard coating thickness; ASTM A653/A653M.
 - 2. Weatherstripping: See Section 087100.
- C. _____, Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.

- b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
- c. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
- D. _____, Fire-Rated Door Frames: Full profile/continuously welded type.
 - 1. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C or NFPA 252 ("positive pressure fire tests").
 - 2. Temperature-Rise Rating (TRR) Across Framed Door Thickness: In accordance with local building code and authorities having jurisdiction.
 - 3. Provide units listed and labeled by ITS (DIR) or UL (DIR).
 - a. Attach fire rating label to each fire rated unit.
 - 4. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (152 mm), maximum, above floor at 45 degree angle.

2.04 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch (0.4 mm) dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
 - 1. Fire-Rated Frames: Comply with fire rating requirements indicated.

2.05 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches (102 mm) as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install frames in accordance with manufacturer's instructions and related requirements of specified frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 087100.
- F. Coordinate installation of electrical connections to electrical hardware items.
- G. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch (1.5 mm) measured with straight edges, crossed corner to corner.

END OF SECTION

**SECTION 081416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, acoustical, special function, and _____.

1.02 RELATED REQUIREMENTS

- A. Section 081113 - Hollow Metal Doors and Frames.
- B. Section 087100 - Door Hardware.
- C. Section 088000 - Glazing.
- D. Section 092116 - Gypsum Board Assemblies: Bullet-resistant sheathing and wallboard for bullet-resistant partitions and walls.
- E. Section 099123 - Interior Painting: Field finishing of doors.
- F. Section 099300 - Staining and Transparent Finishing: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- E. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- F. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.
- G. AWI (QCP) - Quality Certification Program; Current Edition.
- H. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- I. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- J. BHMA A156.2 - Bored and Preassembled Locks and Latches; 2022.
- K. BHMA A156.13 - Mortise Locks & Latches Series 1000; 2022.
- L. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames; 2012.
- N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- O. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- D. Woodwork Quality Assurance Program:
 - 1. Comply with AWI (QCP) woodwork association quality assurance service/program in accordance with requirements for work specified in this section; www.awiqcp.org/#sle.
 - 2. Provide labels indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 3. Provide designated labels on shop drawings as required by quality assurance program.
 - 4. Provide designated labels on installed products as required by quality assurance program.
 - 5. Submit documentation upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:

1. Horton Automatics, a division of Overhead Door Corporation; FlexBarn:
www.overheaddoor.com/#sle.
2. Krieger Specialty Products; ____: www.kriegerproducts.com/#sle.
3. VT Industries, Inc; ____: www.vtindustries.com/#sle.
4. Substitutions: See Section 016000 - Product Requirements.

2.02 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
 1. Provide solid core doors at each location.
 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 3. Wood veneer facing for field transparent finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 1. Vertical Edges: Same species as face veneer.
- B. Facing Adhesive: Type I - waterproof.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- G. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.
- B. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 081113.
- B. Glazed Openings:
 1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.
- C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

**SECTION 083100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-mounted access units.
- B. Ceiling-mounted access units.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Fire-Rated Wall-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Wall Fire-Rating: 1 hour.
 - 3. Panel Material: Steel.
 - 4. Size: as indicated in drawings.
 - 5. Size: 12 by 12 inches (305 by 305 mm).
 - 6. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.
- B. Ceiling-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Size - Lay-In Grid Ceilings: To match module of ceiling grid.
 - 3. Size - Other Ceilings: 24 by 24 inches (609.6 by 609.6 mm).
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

2.02 WALL- AND CEILING-MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Babcock-Davis; _____: www.babcockdavis.com/#sle.
 - 2. Best Access Doors: www.bestaccessdoors.com/#sle.
 - 3. FF Systems, Inc: www.ffsystemsinc.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 PREPARATION

- A. 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 083613
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Overhead sectional doors, manually operated.
- C. Operating hardware and supports.
- D. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 260583 - Wiring Connections.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- D. DASMA 102 - American National Standard Specifications for Sectional Doors; 2018.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
- F. NEMA MG 00001 - Motors and Generators; 2024.
- G. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Samples: Two panel finish samples, ___ by ___ inch (___ by ___ mm) in size, illustrating color and finish.
- E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- F. Installer's qualification statement.
- G. Specimen warranty.

1.05 WIND PERFORMANCE REQUIREMENTS

- A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable building code and detailed in structural documents.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- B. Comply with applicable code for motor and motor control requirements.

1.07 WARRANTY

- A. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty for electric operating equipment. Complete forms in Owner's name and register with manufacturer.
- C. Finish Warranty: 5 Years
- D. Parts and Hardware Warranty
 - 1. Parts and Hardware: 1 Year
 - 2. Springs: 2 Years or 50,000 cycles.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sectional Doors:
 - 1. Clopay Building Products: www.clopaydoor.com/#sle.
 - 2. Raynor Garage Doors; ____: www.raynor.com/#sle.
 - 3. Cookson; [//www.cooksondoor.com/](http://www.cooksondoor.com/).
 - 4. Cornell; <https://www.cornelliron.com/>

2.02 ALUMINUM DOORS

- A. Door Type OT: Cookson Extreme Sectional Door: [https EX904](https://www.cookson.com/ex904): Aluminum Full View Sectional Door. Doors: Stile and rail aluminum with glazed panels; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Door Panels: Flush aluminum construction; outer aluminum sheet 2 1/8 inch (____ mm) thick; inner aluminum sheet ____ inch (____ mm) thick; flat profile; core reinforcement of ____ inch (____ mm) roll formed aluminum; rabbeted weather joints at meeting rails; insulated.
 - 2. Door Nominal Thickness: 2 1/8 inches (54 mm) thick.
 - 3. Finish: Factory powder coated; color as selected from the manufacturer's full line.
 - 4. Glazed Lites: 2 glazed lights per panel, 5 row; set in place with security glazing stops.
 - a. Glazing: Tempered; insulated glass units; tinted; 5/8 inch (15.9 mm) overall thickness.
 - 5. Solid Panel: Bottom panel - Solid Full Panel Width
 - 6. Manual Operation: Pull rope.
 - 7.
- B. Door Type GT: Cookson Extreme Sectional Door: [https EX904](https://www.cookson.com/ex904): Aluminum Full View Sectional Door. Doors: Stile and rail aluminum with solid and glazed panels; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Door Panels: Flush aluminum construction; outer aluminum sheet 2 1/8 inch (____ mm) thick; inner aluminum sheet ____ inch (____ mm) thick; flat profile; core reinforcement of ____ inch (____ mm) roll formed aluminum; rabbeted weather joints at meeting rails; insulated.
 - 2. Door Nominal Thickness: 2 1/8 inches (54 mm) thick.
 - 3. Finish: Factory powder coated; color as selected from the manufacturer's full line.

4. Glazed Lites: Three glazed lights per panel, 5 row; set in place with security glazing stops.
 - a. Glazing: Tempered; insulated glass units; tinted; 5/8 inch (15.9 mm) overall thickness.
5. Solid Panel: Bottom panel - Solid Full Panel Width
6. Electric Operation: Electric control station.

2.03 COMPONENTS

- A. Door Type GT Track: Rolled galvanized steel, 0.096 inch (2.43 mm) minimum thickness; 3 inch (75 mm) wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch (6 mm) thick.
- B. Door Type OT Track: Rolled galvanized steel, 0.075 inch (1.91 mm) minimum thickness; 2 inch (50 mm) wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch (6 mm) thick.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
 1. Spring Counterbalance:
 - a. Specialized torsion spring counterbalance mechanism sized to weight of the door. Spring to be helically wound, oil tempered, treated with secondary process to increase cycle life and reliability. Spring to be mounted on a solid steel shaft with center coupling
 - b. Cable drum of die cast aluminum with high strength galvanized aircraft cable with minimum 7 to 1 safety factor. Cable to be at minimum 7-19 stranded 3/16 diameter with thimble loop.
 - c. Cable Safety Device: Snubbers to help maintain cable tension.
 - d. Spring cycles:
 - 1) 50,000 cycles standard
 - 2) Maximum cycles on a single shaft.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Aluminum Sheet: ASTM B209/B209M, 5005 alloy, H14 temper, plain surface.
- C. Float Glass: Provide float glass glazing, unless noted otherwise.
 1. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
 2. Tinted Types: Color Gray.

2.05 ELECTRIC OPERATION

- A. Electric Operators; Door Type GT:
 1. Motor Enclosure:
 - a. Exterior Doors: NEMA MG 00001, Type 4; open drip proof.

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2. Motor Rating: ____ hp (____ W); continuous duty.
 3. Motor Voltage: 208 volts, three phase, 60 Hz.
 4. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 5. Controller Enclosure: NEMA EN 10250, Type 1.
 6. Opening Speed: 12 inches per second (300 mm/s).
 7. Brake: Adjustable friction clutch type, activated by motor controller.
 8. Manual override in case of power failure.
 9. See Section 260583 for electrical connections.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
1. 24 volt circuit.
 2. Surface mounted, at interior door jamb.
 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
 - b. Secondary Device: Provide electric sensing edge with wireless edge kit or non-monitored safety edge as an option along with continuous-constant control device.
- D. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
- E. Provide interconnection to security system.
- F. Provide radio control antenna detector.
- G. Hand Held Transmitter: Digital control, and resettable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.
- C. If substrate preparation is the responsibility of another entity, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.

- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim and closures.

3.04 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

3.05 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

**SECTION 084313
ALUMINUM-FRAMED STOREFRONTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.

1.02 RELATED REQUIREMENTS

- A. Section 088000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- D. 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.
- E. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. See Section 013000 - 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. Samples: Submit two samples ___x___ inches (___x___ mm) in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Specimen warranty.

1.06 QUALITY ASSURANCE

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.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. 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.
- C. 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. Aluminum-Framed Storefronts:
 - 1. Kawneer North America; _____: www.kawneer.com/#sle.
 - 2. Oldcastle BuildingEnvelope; _____: www.oldcastlebe.com/#sle.
 - 3. Tubelite, Inc; _____: www.tubeliteinc.com/#sle.

2.02 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Front-Set Style, Thermally-Broken:
 - 1. Basis of Design: Kawneer; Trifab 601T Framing System.
 - 2. Vertical Mullion Dimensions: 2 inches wide by 6 inches deep (50 mm wide by 152 mm deep).

2.03 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: Powder Coating.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 2. 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.
 - 3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 4. 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.
 - 5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- 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. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

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2. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Glazing Stops: Flush.
- B. Glazing: See Section 088000.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.

2.06 FINISHES

- A. Color: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- 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. 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 (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 085213
METAL-CLAD WOOD WINDOWS**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AAMA 450 - Performance Rating Method for Muller Combination Assemblies, Composite Units, and Other Muller Fenestration Systems; 2020.
- B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2021.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- I. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015 (Reapproved 2023).
- J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- K. ASTM F2090 - Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms; 2021.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- N. WDMA I.S. 4 - Industry Specification for Preservative Treatment for Millwork; 2024.

1.02 SUMMARY

- A. Section Includes: Wood-framed, aluminum-clad windows of the following types: casement and sash-set fixed.

1.03 REFERENCES

- A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.
- B. Forest Stewardship Council (FSC): FSC Chain-of-Custody Certification.
- C. Insulating Glass Certification Council (IGCC): Insulating Glass Unit Certification.
- D. Insulating Glass Manufacturers Alliance of Canada (IGMAC) and Canadian General Standards Board (CGSB): Insulating Glass Units Standard CAN/CGSB 12.8-97.

- E. International Standards Organization (ISO): ISO 14021 - Environmental Labels and Declarations -- Self-Declared Environmental Claims (Type II Environmental Labeling).
- F. Texas Department of Insurance: Product Evaluation WIN-1875 for compliance with wind loads specified in the International Residential Code (IRC) and the International Building Code (IBC).
- G. K.U.S. Environmental Protection Agency (EPA): ENERGY STAR.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings: Conduct pre-installation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.05 PERFORMANCE REQUIREMENTS

- A. Structural Performance Requirements:
 - 1. Comply with requirements of NAFS.

1.06 SUBMITTALS

- A. Product Data: For each type of product required.
- B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of walls, specified loads, flashings, vents, sealants, and interfaces with all materials not supplied by the window manufacturer, and identification of proposed component parts and finishes.
- C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of material required.
- D. Certificates: Signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- E. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
- F. Manufacturer Instructions: Manufacturer installation, storage, and other instructions.
- G. Sustainable Design Submittals in Compliance with ISO 14021.
- H. Qualification Statements: For manufacturer and installer.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Member in good standing of the Insulating Glass Certification Council (IGCC).
 - 2. Hallmark Certified Manufacturer and member in good standing of the Window and Door Manufacturers Association (WDMA).
 - 3. Member in good standing of the U.S. Green Building Council.
 - 4. U.S. EPA ENERGY STAR Partner.
 - 5. Capable of demonstrating an extended history of window and door design and production.
- B. Installer Qualifications:
 - 1. Minimum five years' experience in the commercial installation of products required for the Project.
 - 2. Experience on at least five projects of similar size, type and complexity as the Project.
 - 3. An entity utilizing workers competent in techniques required by manufacturer for product types and applications indicated.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

- B. Deliver materials to Project in manufacturer's original unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials and accessories protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer off ground, under cover and not exposed to weather and construction activities.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's transferrable, non-prorated limited warranty.
 - 1. Warranty Period, Glass: 20 years.
 - 2. Warranty Period, Non-Glass Parts: 10 years.
- B. Special Warranty: Installer's standard form in which installer agrees to repair or replace windows that fail due to poor workmanship or faulty installation within the specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 PRODUCT

2.01 METAL-CLAD WOOD WINDOWS

- A. General: Provide windows complying with the performance requirements indicated and tested according to NAFS.
- B. Basis-of-Design Product: Subject to compliance with requirements provide Andersen Corporation: Andersen E-Series windows.
- C. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01 25 00 - "Substitution Procedures"

2.02 MATERIALS

- A. Construction:
 - 1. Cladding: Extruded aluminum, minimum thickness 0.050 inch (1.27 mm).
 - 2. Frame: Preservative treated laminated veneer lumber.
 - 3. Interior Exposed Frame: Preservative treated solid lumber, kiln dried and suitable for stain or painted finish.
 - 4. Sash: Preservative treated solid lumber, kiln dried and suitable for stain or painted finish.
- B. Wood Species: Pine
- C. Interior Finish:
 - 1. Primed: Factory-applied before assembly. .
- D. Exterior Finish:
 - 1. Anodized Frame: Architectural quality, in compliance with AAMA 611 Class I Black (Basis of Design) - Architect to select from manufacturer's full line.
 - 2. Anodized Sash: Architectural quality, in compliance with AAMA 611 Class I Black (Basis of Design) - Architect to select from manufacturer's full line.

2.03 WINDOW W1.

- A. Window Type and Performance Requirements: As indicated in window schedule ???Insert window type???.
 - 1. Casement Performance Class CW and Grade, Non-Impact-Resistant: PG50 ???Insert requirements???
- B. Air Infiltration Requirements:
 - 1. Air Infiltration Rate: < 0.2 cfm/sf².
- C. BEnvironmental Certifications:

-
1. ENERGY STAR performance requirements.
 2. Indoor air quality performance.
- D. Weatherstrip:
1. Type and Material for Hung or Gliding: Three fins and pile, polypropylene.
 2. Type and Material for Casement or Awning: Flexible tubular, vinyl.
- E. Installation Flange Type: Extruded aluminum.
- F. Hardware:
1. Operator Gear Type and Material: Rotary, die-cast zinc and stainless steel components.
 2. Hinge Type and Material: Concealed hinge and track, 300 Series stainless steel.
 3. Crank Handle Type, Material and Finish: Folding, die-cast zinc, plated.
 4. Operator Cover Material and Finish: Die-cast zinc, plated.
 5. Sash Lock Type and Material: Single-actuation, die-cast zinc and engineered polymer components.
 6. Crank and Sash Lock Color: to be selected by architect
 7. Operator Gear Type and Material: Rotary, die-cast zinc and stainless steel components.
 8. Hinge Type and Material: Piano hinge, 300 Series stainless steel.
 9. Crank Handle Type, Material and Finish: Folding, die-cast zinc, plated.
 10. Operator Cover Material and Finish: Die-cast zinc, plated.
 11. Sash Lock Type and Material: Multi-point, die-cast zinc components.
 12. Crank and Lock Lever Finish: To be selected by architect
 13. Hinge Type and Material: Friction hinge/stay, 300 Series stainless steel.
 14. Sash Lock Type and Material: Lever, die-cast zinc.
 15. Sash Lock Color: To be selected by architect
 16. Window Opening Control Device and Color: Provide device to restrict operable sash to less than four inches maximum clear opening, releasable in compliance with ASTM F2090, To be selected by architect
 17. Vent Limitation Hardware: Provide fixed vent limiters to limit sash travel.
 18. Sash Lock/Tilt Mechanism Type and Material: Self-latching, die-cast zinc.
 19. Sash Lift Type and Material: Surface mounted, die-cast zinc.
 20. Sash Lock and Sash Lift Finish: To be selected by architect
 21. Balancer Type and Material: Spring-loaded block and tackle, galvanized steel.
 22. Jamb Liner:
 - a. a. Type and Material: Concealed, rigid vinyl.
 - b. b. Color: To be selected by architect
 - c. c. Interior Inserts: Wood-veneered vinyl, species to match window.
 - d. d. Exterior Inserts: Aluminum, color to match window.
 23. Window Opening Control Device: Provide device to restrict operable sash to less than four inches maximum clear opening and releasable, in compliance with ASTM F2090, To be selected by architect
 24. Sash Lock Mechanism Type and Material: Flush mounted die-cast zinc.
 25. Sash Lift Type and Material: Surface mounted die-cast zinc.
 26. Sash Lock and Lift Color: To be selected by architect
 27. Roller Type and Material: Dual adjustable, brass.
 28. Head and Sill Track Material and Color: Rigid vinyl, To be selected by architect.
- G. Divided Lights:
1. 1. Full Divided Light: Permanent exterior and interior attachment, spacer between glass panes.
 - a. Exterior Style: Chamfer.
-

-
- b. Interior Style: Ovolo
 - c. c. Width: 5/8 inch (15.88 mm).
 - d. d. Pattern: As shown in Drawings ???Insert pattern designation???.
 - e. e. Spacer Color: Match insulated glass spacer color.
 - f. f. Exterior Color: Match window ???Insert requirements???.
 - g. g. Interior Finish: Match window ???Insert requirements???.
2. 2. Simulated Divided Light: Permanent exterior and interior attachment, no spacer between glass panes.
 - a. a. Style: Ovolo.
 - b. b. Width: 5/8 inch (15.88 mm).
 - c. c. Pattern: As shown in Drawings ???Insert pattern designation???.
 - d. d. Spacer Color: Match insulated glass spacer color.
 - e. e. Exterior Color: Match window ???Insert requirements???.
 - f. f. Interior Finish:
 3. 3. Finelight Grille: Permanently installed between glass panes.
 - a. a. Pattern: As shown in Drawings ???Insert pattern designation???.
 - b. b. Width, Shape and Color: 5/8 inch (15.88 mm), flat, Match window ???Insert requirements???.
 - c. c. Width, Shape and Color: 3/4 inch (19.05 mm), contoured, Match window ???Insert requirements???.
 - d. d. Material: Aluminum.
- H. Insect Screens:
1. 1. Type: Conventional.
 - a. a. Frame Material: Aluminum.
 - b. b. Painted Finish and Color: Factory-applied baked-on silicone polyester enamel ???Insert color??? Bronze.
 - c. c. Veneered Finish and Species: Wood veneer to match window.
 - d. d. Insect Screen Material: Fiberglass mesh.
 2. 2. Type: Retractable.
 - a. a. Frame Material: Wood-veneered aluminum to match window.
 - b. b. Insect Screen Material: Fiberglass mesh.
 - c. c. Insect Screen Pull Type, Material and Color: Surface mounted, die-cast zinc, Bronze.
 3. 3. Type: Hinged.
 - a. a. Frame Material: Wood-veneered aluminum.
 - b. b. Hinge Type: Pivot.
 - c. c. Insect Screen Material: Fiberglass mesh.
 - d. d. Insect Screen Pull Type, Material and Color: Surface mounted, die-cast zinc, White.
 4. 4. Type: Retractable.
 - a. a. Frame Material: Wood-veneered aluminum to match window.
 - b. b. Insect Screen Material: Fiberglass mesh.
 - c. c. Insect Screen Pull Type, Material and Color: Surface mounted, die-cast zinc, Bronze.
 5. 5. Type: Conventional full.
 - a. a. Frame Material: Aluminum.
 - b. b. Painted Finish and Color: Factory-applied baked-on silicone polyester enamel ???Insert color??? Color as selected by Architect from manufacturer's available exterior colors.
-

- c. c. Insect Screen Material: Fiberglass mesh.
- I. Exterior Trim and Accessories:
 - 1. Type: 2 inch (50.8 mm) Brick Mould.
 - 2. Material: Factory-applied extruded aluminum with corner keys.
 - 3. Finish and Color: Match windows

PART 3 EXECUTION

3.01 EXAMINATION

- A. A. Verify that all substrate conditions are suitable for installation in compliance with manufacturer's recommendations.
- B. B. Do not begin installation until substrates have been properly prepared and any conditions not in compliance with manufacturer's recommendations have been corrected.

3.02 INSTALLATION

- A. A. General: Comply with manufacturer's product recommendations, including but not limited to the Andersen Unit Installation Guide, installation information in product literature and on product packaging. Comply with Drawings and Shop Drawings for installing windows, hardware, accessories, and other components.
- B. B. Install windows plumb, level and square. Anchor windows securely to structure in correct orientation to flashing and adjacent construction as indicated. Comply with product installation instructions for proper flashing integration into wall system. Install windows so as to drain water penetration to the exterior.
- C. C. Adjust sashes, insect screens, ventilators, hardware and accessories as applicable for correct fit. Adjust weatherstrip for smooth operation and weather-tight closure.

FIELD QUALITY CONTROL

- A. A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for observation of product installation in accordance with manufacturer's recommendations.
 - 1. 1. Site Visits: ???Insert site visit requirements???
- B. B. Field Testing: Provide field testing of installed units.
 - 1. 1. Test units in compliance with AAMA 502.
 - 2. 2. Use test equipment calibrated according to ASTM E1105.

4.02 CLEANING

- A. A. Refer to manufacturer for guidance on timing for when best to remove protective films and non-permanent labels after installation.
- B. B. Remove excess sealant, soiling, dirt and other substances. Clean window frame and glass surfaces. Avoid damaging coatings and finishes
- C. C. Touch-up, repair or replace glass or other window components broken, scratched or damaged during construction prior to Substantial Completion.
- D. D. Remove and lawfully dispose of construction debris from Project site.

4.03 PROTECTION

- A. A. Protect installed windows and finish surfaces from damage during construction until completion of Project and acceptance by Owner.

END OF SECTION

**SECTION 085653
SECURITY WINDOWS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Security transaction windows with pass-through device.

1.02 RELATED REQUIREMENTS

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. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- C. SSPC-Paint 33 - Coal Tar Mastic Coating, Cold-Applied; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Furnish anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, to be embedded into concrete or masonry, with setting diagrams and installation, to applicable installer in time for installation.
- B. Preinstallation Meeting: Prior to start of installation arrange a meeting on site to familiarize installer and installers of related work with requirements relating to this work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's published data showing materials, construction details, dimensions of components, and finishes.
- C. Shop Drawings: Drawings prepared specifically for this project, showing plans, elevations, sections, details of construction, anchorage to other work, hardware, and glazing.
- D. Test Reports: Test reports for specific window model and glazing to be furnished, showing compliance with specified requirements; window and glazing may be tested separately, provided window test sample adequately simulates the glazing to be used.
 - 1. Include testing agency qualifications.
- E. Samples for Selection of Applied Finishes: Color charts for factory finishes.
- F. Coordination Drawings: For each window opening, show locations and details of items necessary to anchor windows that must be installed by others, in sufficient detail that installer of those items can do so correctly without reference to the actual window itself.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent testing agency able to show experience in conducting tests of the type specified and:

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.

-
- B. Provide manufacturer's warranty agreeing to repair or replace windows and window components that fail within three years after Date of Substantial Completion due to, but not limited to, the following:
1. Structural failure, failure of welds, and deterioration of metals and finishes beyond that expected under detention use and normal weathering.
 2. Failure of glazing due to excessive deflection of supporting members under wind load.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Security Transaction Windows with Pass-Through Device:
1. Architectural Armer; www.architecturalarmour.com/.
 2. Substitutions: See Section 016000 - Product Requirements.

2.02 ASSEMBLIES

- A. Security and Detention Windows:
1. Dimensions, profiles, features, and performance specified and indicated on drawings are required; do not deviate unless specifically approved by Architect under substitution procedures; see Section 016000.
 2. Design to fit openings indicated on drawings; design to accommodate deviation of actual construction from dimensions indicated on drawings.
 3. Fabricate frames and sash with corners mitered or coped full depth with concealed welded joints.
 4. Design anchorages to provide performance equivalent to that required for window unit; provide anchorages at least equivalent to those by which the tested units were anchored to the test frame.
 5. Separate dissimilar metals to prevent corrosion by galvanic action by painting contact surfaces with primer or with sealant or tape recommended by manufacturer for the purpose.
 6. Weld components before finishing and in concealed locations, to greatest extent possible; minimize distortion and discoloration of finish; remove residue of welding; grind exposed welds smooth and finish to match.
 7. Label units to indicate which side is which, such as inside/outside or secure/non-secure; use labels that are removable after installation but durable enough not to be lost during delivery, storage, handling, and installation.

2.03 SECURITY TRANSACTION WINDOWS WITH PASS-THROUGH DEVICE

- A. Security Transaction Windows with Pass-Through Device:
1. Location: Built within exterior and interior wall, as indicated on drawings.
 2. Type of Use: Walk-up.
 3. Window Type: Fixed.
 - a. Overall Window Frame Size: As indicated on drawings.
 - b. Frame Material: Stainless steel.
 4. Glazing: Single (monolithic), clear.
 5. Pass-Through Device: Drawer mounted below window and deal tray built into window sill.
 - a. Operation: Manual.
 - b. Transaction Drawer Size: 20 inch wide by 5 inch high by 21 inch deep (508 mm wide by 127 mm high by 533 mm deep).
 - c. Material: Stainless steel.
 6. Counter Staging Area: Attendant-side.
 7. Communication: Integrated microphone, speaker, and call button.
 8. Products:

- a. Architectural Armer; SFW5: <https://www.architecturalarmour.com/>.
- b. Substitutions: See Section 016000 - Product Requirements.

2.04 ASSEMBLY COMPONENTS

- A. Formed Steel Framing: ASTM A1008/A1008M, Designation CS (commercial steel), cold-rolled steel sheet; 12 gauge, 0.1046 inch (2.66 mm) minimum thickness.
- B. Stainless Steel Framing: ASTM A666/A666M, Type 304; 14 gauge, 0.0781 inch (1.98 mm) minimum thickness.
- C. Frame Anchors: Mild steel plates, shapes, or bars, concealed in completed construction; provide anchorage devices as necessary to securely fasten windows to adjacent construction; use security fasteners for exposed anchors.
 1. Provide minimum of two anchors per side of window plus one additional anchor for each 18 inches (457 mm) or fraction thereof more than 36 inches (915 mm) in height or width.
- D. Weatherstripping: Factory installed; molded EPDM or neoprene.
- E. Glazing Seals: Factory installed; molded EPDM or neoprene compressible gaskets and compression strips.
- F. Security Fasteners: Operable only by tools produced by fastener manufacturer or manufacturer's licensee; head style appropriate to installation conditions, strength, and finish of materials being fastened; use countersunk heads wherever possible.
- G. Deal Trays: Formed stainless steel, recessed into counter or sill for mounting under glazing frame.
 1. Style: Plain curved recess welded into counter or sill.
 2. Clear Opening Height: 1-1/2 inches (38 mm).
 3. Tray Dimensions: 12 by 8 inches (305 by 203 mm), wide by deep.
- H. Transaction Drawers: Slide-out drawer with drop down front on non-secure side and cover on secure side that closes automatically when drawer is extended; ball-bearing telescoping drawer slides.
 1. Material: Formed stainless steel.
 2. Inside Dimensions: Minimum of 15 inches (390 mm) wide by 8 inches (200 mm) deep by 4 inches (100 mm) high.
- I. Bituminous Paint: Cold-applied asbestos-free asphalt mastic, complying with SSPC-Paint 33; 30 mils, 0.030 inch (0.76 mm) minimum thickness per coat.

2.05 FINISHES

- A. Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that window openings are ready for installation of windows.
- B. Notify Architect if conditions are not suitable for installation of windows; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and drawing details.
- B. Install windows in correct orientation (inside/outside or secure/non-secure).
- C. Anchor windows securely in manner so as to achieve performance specified.
- D. Separate metal members from concrete and masonry using bituminous paint.

- E. Set sill members and sill flashing in continuous bead of sealant.

3.03 ADJUSTING

- A. Adjust operating components for smooth operation while also providing tight fit at contact points and a secure enclosure; lubricate operating hardware.

3.04 CLEANING

- A. Clean exposed surfaces promptly after installation without damaging finishes.
- B. Remove and replace defective work.

3.05 CLOSEOUT ACTIVITIES

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

- B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

- C. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames".
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Forced Entry Doors and Frames".
4. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
5. Division 08 Section "Fire-Rated Steel Framed Entrances".

- D. Codes and References: Comply with the version year 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. UL10C - 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.

1.3 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.
 - 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. 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.
- D. 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.

1.4 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.

1.5 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.
- 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),

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.

1.6 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".

1.7 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 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.

1.8 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

2.1 MATERIALS

2.2 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:
 - 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. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
 1. Manufacturers:
 - a. Pemko (PE).

2.4 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.
- 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. Corbin Russwin (RU) - Access 3 AP.
 - b. Sargent (SA) - Degree DG1.
 - c. No Substitution.
- 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:

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.

2.5 KEY CONTROL

P. Electronic Key Management System: Provide an electronic key control system with Stand-alone Plug and Play features including advanced RFID technology. Touchscreen interface with PIN access for keys individually locked in place. Minimum 1,000 system users and 21 iFobs for locking receptors. System shall have a minimum 250,000 audit events screen displayed or ability to be exported via USB port.

1. Manufacturers:
 - a. Medeco (MC).

2.6 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.

2.7 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.
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.

2.8 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 UL305. 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.

2.9 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. Corbin Russwin Hardware (RU) - DC6000 Series.
 - b. Norton Rixson (NO) - 7500 Series.
 - c. Sargent Manufacturing (SA) - 351 Series.

C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, high efficiency 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 of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

1. Manufacturers:
 - a. Corbin Russwin (RU) - DC5000 Series.
 - b. Norton Rixson (NO) - 2800ST Series.
 - c. Sargent Manufacturing (SA) - 422 Series.

2.10 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door Protective Trim:

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, .050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Rockwood (RO).

2.11 DOOR STOPS AND HOLDERS

- ### A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

- B. 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. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 - 1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Rockwood (RO).
 - c. Sargent Manufacturing (SA).

2.12 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 UL10C 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. Pemko (PE).

2.13 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.

2.14 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

3.1 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.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 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.
 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.

3.4 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.

3.5 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.

3.6 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.7 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. PE - Pemko
3. SA - SARGENT
4. RO - Rockwood
5. RF - Rixson

Hardware Sets

Set: 1.01717

Doors: 100A

2 Continuous Hinge	CFMxx-1100		PE	087100
1 Mullion	SML980S	PC	SA	087100
2 Rim Exit Device, Classroom	DG164 PE8813 NEP	US32D	SA	087100
1 Mullion Cylinder Kit	DG164 980C1	US26D	SA	087100
3 Core	DG163 6300	US15	SA	087100
2 Surface Closer	351 CPS	EN	SA	087100
2 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
2 Astragal	18061CNB TKSP		PE	087100
1 Rain Guard	346C TKSP		PE	087100
2 Sweep	3452CNB TKSP		PE	087100
1 Threshold	2005AT MS25SS		PE	087100

Notes: Perimeter gasketing integral with hollow metal frame

Set: 2.0

Doors: 100B

2 Continuous Hinge	CFMxx-1100		PE	087100
1 Mullion	12-980	PC	SA	087100
1 Rim Exit Device, Passage	12 PE8815 NEP	US32D	SA	087100
1 Mullion Cylinder Kit	DG164 980C1	US26D	SA	087100

1 Core	DG163 6300	US15	SA	087100
2 Surface Closer	351 CPS	EN	SA	087100
2 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
2 Astragal	18061CNB TKSP		PE	087100
1 Gasketing	S88BL		PE	087100

Set: 3.0

Doors: 109

1 Continuous Hinge	CFMxx-1100		PE	087100
1 Rim Exit Device, Classroom	DG164 12 PE8813 NEP	US32D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Rain Guard	346C TKSP		PE	087100
1 Gasketing	S88BL		PE	087100
1 Sweep	3452CNB TKSP		PE	087100
1 Threshold	2005AT MS25SS		PE	087100

Notes: Perimeter gasketing integral with hollow metal frame

Set: 4.0

Doors: 110B, 118C, 118D

1 Continuous Hinge	CFMxx-1100		PE	087100
1 Rim Exit Device, Classroom	DG164 PE8813 NEP	US32D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Rain Guard	346C TKSP		PE	087100
1 Sweep	3452CNB TKSP		PE	087100
1 Threshold	2005AT MS25SS		PE	087100

Notes: Perimeter gasketing integral with hollow metal frame

Set: 5.0

Doors: 107

1 Continuous Hinge	CFMxx-1100		PE	087100
1 Dormitory/Exit Lock	DG164 8225 LNP	US32D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Rain Guard	346C TKSP		PE	087100
1 Gasketing	S88BL		PE	087100
1 Sweep	3452CNB TKSP		PE	087100
1 Threshold	2005AT MS25SS		PE	087100

Notes: Perimeter gasketing integral with hollow metal frame

Set: 6.0

Doors: 101, 222

1 Continuous Hinge	CFMxx-1100		PE	087100
1 Passage Latch	8215 LNP	US26D	SA	087100
1 Surface Closer	351 OTB	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 7.0

Doors: 112A

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK	087100
1 Passage Latch	8215 LNP	US26D	SA	087100
1 Surface Closer	351 P10	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 8.0

Doors: 212A, 212B

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK	087100
1 Passage Latch	8215 LNP	US26D	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 9.0

Doors: 215, 216, 217

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Passage Latch	8215 LNP	US26D	SA	087100
1 Surf Overhead Stop	10-x36	630	RF	087100
3 Silencer	608		RO	087100

Set: 10.0

Doors: 105

1 Surface Closer	351 OTB	EN	SA	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Notes: Security hinges and multipoint lock provided with door.

Set: 11.0

Doors: 102

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Privacy Lock	V21 8266 LNP	US26D	SA	087100
1 Surface Closer	351 P10	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Mop Plate	K1050 4" x 1" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100
1 Coat Hook	RM801	US32D	RO	087100

Set: 12.0

Doors: 115

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Privacy Lock	V21 8266 LNP	US26D	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Mop Plate	K1050 4" x 1" LDW CSK BEV	US32D	RO	087100
1 Gasketing	S88BL		PE	087100
1 Coat Hook	RM801	US32D	RO	087100

Set: 13.0

Doors: 219, 220, 221, 223

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Privacy Lock	V21 8266 LNP	US26D	SA	087100
1 Surface Closer	351 P10	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Mop Plate	K1050 4" x 1" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100
1 Coat Hook	RM801	US32D	RO	087100

Set: 14.0

Doors: 117

3 Hinge, Full Mortise, Hvy Wt	T4A3386 4-1/2" x 4-1/2"	US32D	MK	087100
1 Privacy Lock	3 V21 8266 LNP	US32D	SA	087100
1 Wall Stop	406	US32D	RO	087100

Set: 15.0

Doors: 103, 104, 106, 213

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Office/Entry Lock	DG164 8205 LNP	US26D	SA	087100
1 Core	DG163 6300	US15	SA	087100

1 Surface Closer	351 OTB	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100
1 Coat Hook	RM801	US32D	RO	087100

Set: 16.0

Doors: 108, 111, 113, 211, 218, 224, 225

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Storeroom/Closet Lock	DG164 8204 LNP	US26D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 OTB	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 17.0

Doors: 214

3 Hinge, Full Mortise	TA2714xNRP 4-1/2" x 4-1/2"	US26D	MK	087100
1 Storeroom/Closet Lock	DG164 8204 LNP	US26D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Wall Stop	406	US32D	RO	087100
3 Silencer	608		RO	087100

Set: 18.0

Doors: 204, 205, 206, 207, 208, 209, 210

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK	087100
1 Passage Latch	8215 LNP	US26D	SA	087100
1 Surface Closer	351 OTB	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Sweep	3452CNB TKSP		PE	087100
1 Acoustic Seal Set	PEMKOSTCSET-2C	BL	PE	087100

Set: 19.0

Doors: 112B, 118E, 118F, 118G, 118H, 118I, 118J

1 Hardware	By door mfg			
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Set: 20.0

Doors: 110A, 118A, 118B

1 Continuous Hinge	CFMxx-1100		PE	087100
1 Rim Exit Device, Classroom	DG164 12 PE8813 NEP	US32D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Sweep	3452CNB TKSP		PE	087100

1 Gasketing S88BL PE 087100

Set: 21.0

Doors: 114, 116

3 Hinge, Full Mortise, Hvy Wt	T4A3386 4-1/2" x 4-1/2"	US32D	MK	087100
1 Classroom Lock	3 DG164 8237 LNP	US32D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 22.0

Doors: 119

3 Hinge, Full Mortise	TA2714xNRP 4-1/2" x 4-1/2"	US26D	MK	087100
1 Storeroom/Closet Lock	DG164 8204 LNP	US26D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 CPSH	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100

Set: 23.0

Doors: 200

1 Continuous Hinge	CFMxx-1100		PE	087100
1 Classroom Lock	DG164 8237 LNP	US26D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 CPS	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 24.0

Doors: 203

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK	087100
1 Classroom Lock	DG164 8237 LNP	US26D	SA	087100
1 Core	DG163 6300	US15	SA	087100
1 Surface Closer	351 OTB	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 25.0

Doors: ST1A, ST1B, ST2A, ST2B, ST2C

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK	087100
1 Rim Exit Device, Passage	12 PE8815 NEP	US32D	SA	087100
1 Surface Closer	422 CTB2	EN	SA	087100
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1 Wall Stop	406	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

Set: 26.0

Doors: [ST2C](#)

1 Doors not found. Advise if they are in scope

END OF SECTION 087100

**SECTION 088000
GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- C. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- D. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- E. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- F. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- G. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- H. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.04 SUBMITTALS

- A. See Section 013000 - 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. Samples: Submit two samples ___ by ___ inch (___ by ___ mm) in size of glass units.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 017800 - 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 MANUFACTURERS

- A. Float Glass Manufacturers:
1. Cardinal Glass Industries; _____: www.cardinalcorp.com/#sle.
 2. Guardian Glass, LLC; _____: www.guardianglass.com/#sle.
 3. Pilkington North America Inc; _____: www.pilkington.com/na/#sle.
 4. Vitro Architectural Glass (formerly PPG Glass); _____: www.vitroglazings.com/#sle.
 5. Substitutions: See Section 016000 - Product Requirements.

2.02 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. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 2. 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.
 3. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
1. In conjunction with weather barrier related materials described in other sections, as follows:
- 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.
 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.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
 3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

2.04 INSULATING GLASS UNITS

- A. Manufacturers:
1. Cardinal Glass Industries; _____: www.cardinalcorp.com/#sle.
 2. Guardian Glass, LLC; _____: www.guardianglass.com/#sle.
 3. Pilkington North America Inc; _____: www.pilkington.com/na/#sle.Pilkington North America Inc; _____: www.pilkington.com/na/#sle.
 4. Vitro Architectural Glass (formerly PPG Glass); _____: www.vitroglazings.com/#sle.
 5. Substitutions: See Section 016000 - Product Requirements.
- B. 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: as selected by architect from manufacturer's full line..
 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.
 - b. Color: as selected by architect from manufacturer's full line..
 6. Purge interpane space with dry air, hermetically sealed.
- C. Type IG1 - Insulating Glass Units: Vision glass, double glazed.
1. Applications: Exterior glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Gray.
 - b. Coating: Self-cleaning type, on #1 surface.
 4. Metal edge spacer.
 5. Inboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 6. Total Thickness: 1 inch (25.4 mm).
 7. Thermal Transmittance (U-Value), Summer - Center of Glass: _____, nominal.
 8. Visible Light Transmittance (VLT): 35 percent, nominal.
 9. Solar Heat Gain Coefficient (SHGC): 0.29, nominal.
- D. Type IG2 - Insulating Glass Units: Spandrel glazing.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Gray.
 - b. Coating: Same as on vision units, on #2 surface.
 4. Metal edge spacer.
 5. Inboard Lite: Heat-strengthened float glass, 1/4 inch (6.4 mm) thick.
 - a. Tint: Gray.
 - b. Opacifier Color: Gray.
 6. Total Thickness: 1 inch (25.4 mm).

2.05 BASIS OF DESIGN - INSULATING GLASS UNITS

- A. Basis of Design - Insulating Glass Units: Vision glazing, with low-e coating.
1. Applications: Exterior insulating glass glazing unless otherwise indicated.
 2. Space between lites filled with air.
 3. Total Thickness: 1 inch (25.4 mm).
 4. Thermal Transmittance (U-Value), Summer - Center of Glass: _____, nominal.
 5. 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.
 6. Spacer Color: Black.
 7. Edge Seal:
 8. Color: Black.
 9. Purge interpane space with dry air, hermetically sealed.

10. Basis of Design - Vitro Architectural Glass (formerly PPG Glass):
www.vitroglazings.com/#sle.
11. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Glass Tint: Solargray (light-gray).
12. Inboard Lite: Heat-strengthened float glass, 1/4 inch (6.4 mm) thick.
 - a. Glass: Clear.

2.06 GLAZING UNITS

- A. Type G1 - Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch (6.4 mm), nominal.

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 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.

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

3.04 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.

3.05 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent 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.

3.06 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

**SECTION 088300
MIRRORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.
 - 1. Annealed float glass.

1.02 RELATED REQUIREMENTS

- A. Section 102800 - Toilet, Bath, and Laundry Accessories: Metal mirror frames.

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.
- G. GANA (GM) - GANA Glazing Manual; 2022.
- H. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds: Submit chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), and _____ for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F (10 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Binswanger Mirror/ACI Distribution; ____: www.binswangerglass.com/#sle.
 - 2. Dreamwalls by Gardner Glass Products; Standard Mirrors: www.dreamwalls.com/#sle.
 - 3. Lenoir Mirror Co; ____: www.lenoirmirror.com/#sle.
 - 4. Trulite Glass and Aluminum Solutions; ____: www.trulite.com/#sle.
 - 5. Walker Glass Company Ltd; Walker Glass Mirrors: www.walkerglass.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
- B. Mirror Glass; ____: Clear, annealed float glass; ASTM C1036, with copper and silver coatings, and protective overcoating.
 - 1. Thickness: 1/4 inch (6.4 mm).
 - 2. Edges: Beveled.

2.03 GLAZING COMPOUNDS

- A. Acrylic Sealant; Type ____: ASTM C920, Type S, Grade NS, Class 12-1/2, Uses M and A; single component, solvent curing, non-bleeding; cured Shore A hardness of 15 to 25; clear color.

2.04 ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness.
- C. Glazing Tape: Preformed butyl compound; 10 to 15 Shore A durometer hardness; on release paper.
- D. Glazing Clips: Manufacturer's standard type.
- E. Mirror Attachment Accessories: Stainless steel clips.
- F. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.
- G. Rolled Formed Frame: One piece, roll-formed angle frame, stainless steel, Type 430, satin finish, with welded frame corners, ground and polished smooth.
- H. J-Shape Frame: Aluminum extrusion, dimensions as detailed on drawings.
 - 1. Material: Comply with ASTM B221 (ASTM B221M), 6005-T6 alloy and temper.
 - 2. Finish: Anodized, clear.
 - 3. Four-Sided Frame: Mitered joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for mirrored glazing are correctly sized and within tolerance.
- B. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.

- B. Seal porous mirror frames or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.
- C. Prepare installation in accordance with ASTM C1193 for solvent release sealants, and install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install mirrors in accordance with manufacturer's recommendations.
- B. Set mirrors plumb and level, and free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

3.04 CLEANING

- A. Remove wet glazing materials from finish surfaces.
- B. Remove labels after work is complete.
- C. Clean mirrors and adjacent surfaces.

END OF SECTION

**SECTION 088813
FIRE-RATED GLAZING - SAFTI**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated glazing units.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- E. GANA (SM) - GANA Sealant Manual; 2008.
- F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. ITS (DIR) - Directory of Listed Products; Current Edition.
- H. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- I. UL (DIR) - Online Certifications Directory; Current Edition.
- J. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- K. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- L. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data on Glazing Units: Identify structural, physical, and environmental characteristics, fire-rated application and size limitations, and special handling and installation requirements.
- C. Samples: Two samples ____ by ____ inch (____ by ____ mm) in size showing coloration and design.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- 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.
 - 1. Produce glass products listed and manufactured under follow-up program of inspections conducted by ITS (DIR) or UL (DIR).

1.05 FIELD CONDITIONS

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.

- B. Manufacturer Warranty for Insulating Fire-Protective Glazing Units: Manufacturer's limited 5-year warranty from date of shipping.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire-Resistance-Rated Glass:
 - 1. SAFTI FIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 FIRE-RATED GLAZING UNITS

- A. Safety Glazing Certification: 16 CFR 1201 Category II.
- B. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
 - 1. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
 - 2. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - 3. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire test standards.
 - 4. "T" - meets temperature rise of not more than 450 degrees F (250 degrees C) above ambient at end of 30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test standards.
 - 5. "XXX" - placeholder represents fire-rating period, in minutes.
- C. Type G4 - Fire-Resistance-Rated Glazing: Glazing that blocks radiant heat and contains flames and smoke, as required to achieve indicated fire rating period exceeding 45 minutes when tested in accordance with ASTM E119, with hose stream, where applicable.
 - 1. Applications: Locations indicated on the drawings.
 - 2. Glazing Method: As required for fire rating.
 - 3. Glass Type: 20- to 45-minute fire-resistive units, tempered.
 - a. Product: SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL 45: www.safti.com/#sle.

2.03 ACCESSORIES

- A. Glazing Accessories: As recommended by glazing manufacturer and conforming to listed assemblies.
- B. Setting Blocks: Calcium silicate.
- C. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of glazing stop by thickness to suit application, self-adhesive on one face.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings for glazing meet manufacturer's tolerances.
- B. Verify 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.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings 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 sealant adhesion.

3.03 INSTALLATION

- A. Install glazing in strict compliance with requirements of tested assemblies and written instructions of glass and framing manufacturers.
- 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 lights as stipulated by glass manufacturer.
- D. Set glass lights of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set coated glass lights in correct orientation so coatings face exterior or interior in accordance with requirements of tested assembly.
- F. Prevent glass from contact with contaminating substances that may result from construction operations including, but not limited to, weld spatter, fire safing, plastering, and mortar droppings.

3.04 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent 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 four days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.05 PROTECTION

- A. Remove and replace glass damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

**SECTION 092116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Bullet resistant sheathing and wallboard.

1.02 RELATED REQUIREMENTS

- A. Section 054000 - Cold-Formed Metal Framing: Structural steel stud framing.
- B. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 072100 - Thermal Insulation: Acoustic insulation.
- D. Section 072500 - Weather Barriers: Water-resistive barrier over sheathing.
- E. Section 072700 - Air Barriers: Air- and water-resistive barrier over sheathing.
- F. Section 079200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- G. Section 092216 - Non-Structural Metal Framing.

1.03 REFERENCE STANDARDS

- A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.
- B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- C. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.
- D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.
- J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.
- K. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.

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- M. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).
 - N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
 - O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
 - P. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
 - Q. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
 - R. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.
 - S. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.
 - T. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - U. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
 - V. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.
 - 2. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- D. SSFSA Manufacturer Qualification: Submit documentation of manufacturer association membership.
- E. SSMA Manufacturer Qualification: Submit documentation of manufacturer association membership.
- F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): www.ssmma.com/#sle.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
- C. Store metal products to prevent corrosion.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Grid Suspension Systems: Provide grid suspension systems in accordance with ASTM C840 and GA-216 complying with the following:
 - 1. ICC-ES Evaluation Report No. _____.

2.02 METAL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.
 - 1. Structural Grade: As required to meet design criteria.
- B. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich; ____: www.clarkdietrich.com/#sle.
 - 2. MarinoWARE; ____: www.marinoware.com/#sle.
 - 3. SCAFCO Corporation; ____: www.scafco.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- C. Nonstructural Framing System Components: AISI S220; 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/120 at 5 psf (L/120 at 240 Pa).
 - 1. Studs: C-shaped with knurled or embossed faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C-shaped.
 - 4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company; ____: www.americangypsum.com/#sle.
 - 2. CertainTeed Corporation; ____: www.certainteed.com/#sle.
 - 3. Georgia-Pacific Gypsum; ____: www.gpgypsum.com/#sle.
 - 4. USG Corporation; ____: www.usg.com/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. 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. Thickness:
 - a. Vertical Surfaces: 1/2 inch (13 mm).
 - b. Ceilings: 1/2 inch (13 mm).
 - 5. Mold-Resistant, Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc: www.americangypsum.com/#sle.
 - b. CertainTeed Corporation; M2Tech 1/2" Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
 - c. USG Corporation; Sheetrock Brand Mold Tough Ultracode Core Panels 3/4 in. (19.1 mm): www.usg.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.

2.04 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness 2 inches (50.8 mm).
- B. 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 (6 mm).
- C. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- D. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
 - 1. Corner Beads: Low profile, for 90 degree outside corners.
 - a. Products:
 - 1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
 - 2) ClarkDietrich; Strait-Flex OS-300: www.clarkdietrich.com/#sle.
 - 3) Substitutions: See Section 016000 - Product Requirements.
- E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Fiberglass Tape: 2 inch (50 mm) wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - 2. Joint Compound: Setting type, field-mixed.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping 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 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C1007/AISI S220 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Studs: Space studs at 16 inches on center (at 406 mm on center).
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

3.03 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.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

3.05 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. 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 (0.8 mm).

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.07 PROTECTION

- A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

**SECTION 093000
TILING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Stone thresholds.
- D. Ceramic trim.
- E. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 079005 - Joint Sealers.
- C. Section 092116 - Gypsum Board Assemblies: Description and installation of tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - Specifications for the Installation of Ceramic Tile; 2020.
 - 1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2023.
 - 2. 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.
 - 3. 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.
 - 4. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
 - 5. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.
 - 6. 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.
 - 7. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.
 - 8. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2024).
 - 9. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.
 - 10. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).
 - 11. ANSI A108.12 - Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Modified Dry-Set Mortar; 2023.
 - 12. 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).

13. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.
 14. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.
- B. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
 - C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2025.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives. Include test results where indicated.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: Mount tile and apply grout on one plywood panel, minimum 18 by 18 inches (457 by 457 mm) in size illustrating pattern, color variations, and grout joint size variations.
- E. Samples: Submit two each 3 by 3 inch tile samples for color and product verification.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.
 2. Extra Tile: 2 percent of each size, color, and surface finish combination but not less than 10 square feet of each type.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

1.07 MOCK-UP

- A. Include Tiling in Mock-Up as described in Section 01 4000 - Quality Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.

PART 2 - PRODUCTS

2.01 TILE

- A. Manufacturers: _____.
 1. Refer to Finish Legend
 2. Substitutions: See Section 016000 - Product Requirements.

-
- B. Porcelain Floor Tile
 - 1. Refer to Finish Lete
 - 2. Colors, Sizes, and Patterns: See Finish Plan and Finish Legend.
 - C. Porcelain Wall Tile
 - 1. See Drawings for products.
 - 2. Colors, Sizes, and Patterns: See Interior Elevations and Finish Legend.
 - D. Floor Tile Coefficient of Friction:
 - 1. Minimum Slip Resistance: Dynamic Coefficient of Friction, per ANSI A137.1-2012, shall be 0.42 (per the DCOF AcuTest) for any tile used on walking surface.

2.02 TRIM AND ACCESSORIES

- A. Porcelain/Ceramic Trim: Matching bullnose shapes in sizes coordinated with field tile.
 - 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base, unless indicated otherwise.
 - 2. Manufacturers: Same as for tile.
- B. Non-Porcelain/Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Wall corners, outside and inside.
 - d. Transition between floor finishes of different heights.
 - 1) Schluter Reno, or as indicated on drawings.
 - e. Thresholds at door openings.
 - f. Expansion and control joints, floor and wall.
 - g. Floor to wall joints.
 - h. Borders and other trim as indicated on drawings.
 - 2. Manufacturers:
 - a. Schluter-Systems: www.schluter.com/#sle.
 - b. Genesis APS International: www.genesis-aps.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
- C. Thresholds: Marble, color - as selected, honed finish; 2 inches (50 mm) wide (unless indicated otherwise) by full width of wall or frame opening; 1 inch thick (25 mm thick) (nominal); beveled one long edge with radiused corners on top side; without holes, cracks, or open seams. Fabricated in the sizes and profiles indicated.
 - 1. Applications:
 - a. Where indicated.

2.03 ADHESIVE/BOND COAT MATERIALS

- A. Manufacturers:
 - 1. Bostik Inc: www.bostik-us.com.
 - 2. Mapei Corporation: www.mapei.com.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Adhesive: Latex-Portland Cement Mortar Bond Coat, ANSI A118.4.

2.04 GROUTS

- A. Manufacturers:

1. Bostik Inc: www.bostik-us.com.
 2. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
 3. Mapei Corporation: www.mapei.com.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Grout: 100% solids epoxy grout as specified in ANSI A118.3 - most current standard.
1. Colors: To be selected by Architect from manufacturer's full range.
 2. Locations: At all locations, unless noted otherwise.

2.05 SETTING-BED MATERIALS

- A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.
- B. Waterproofing Membrane: Equivalent to "ECB Anti-Fracture Membrane", as manufactured by NAC Products, Inc.; Cuyahoga Falls, Ohio (Phone: 1-800-633-4622).
1. Provide complete system, including substrate primer/sealer, 40-mil, two component, self-adhering membrane, and appropriate top-coat primer for the material(s) to be placed over the ECB system.
 2. Locations for Use: Below all tile flooring, turned up 1-inch at all edges and concealed by base material, and turned down at least 2-inches into floor drains.
 3. Completed membrane system is intended for waterproofing, and to bridge substrate joints within the limitations stated in manufacturer's current written product data.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORY MATERIALS

- A. Cleavage Membrane: No. 15 (6.9 kg) asphalt saturated felt; complies with ANSI 108.02-3.8.
- B. Vapor Retarder Membrane at Walls: No. 15 (6.9kg) asphalt saturated felt. Complies with ANSI A108.02-3.8.
- C. Waterproofing Membrane: Equivalent to "ECB Anti-Fracture Membrane", as manufactured by NAC Products, Inc.; Cuyahoga Falls, Ohio (Phone: 1-800-633-4622).
1. Provide complete system, including substrate primer/sealer, 40-mil, two component, self-adhering membrane, and appropriate top-coat primer for the material(s) to be placed over the ECB system.
 2. Locations for Use: Below all tile flooring, turned up 1-inch at all edges and concealed by base material, and turned down at least 2-inches into floor drains.
 3. Completed membrane system is intended for waterproofing, and to bridge substrate joints within the limitations stated in manufacturer's current written product data.
- D. Substitutions: Section 01 6000 - Product Requirements.
- E. Reinforcing Mesh: 2 x 2 inch (50 x 50 mm) size weave of 16/16 wire size; welded fabric, galvanized.
- F. Mesh Tape: 2-inch (50 mm) wide self-adhesive fiberglass mesh tape, complies with ASTM C475.

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.
- D. 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. 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.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings. Align joints of wall base and wall tile with those in floor tile.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Use manufacturer's recommended grout joint width. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Install thresholds where indicated.
- I. Sound tile after setting. Replace hollow sounding units.
- J. Keep control and expansion joints free of mortar, grout, and adhesive.
- K. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- L. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- M. Grout tile joints. Use standard grout unless otherwise indicated. Use epoxy grout 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.
- O. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCA Handbook Method F131, epoxy bond coat and grout, unless otherwise indicated.
 - 1. Use waterproofing membrane under all tile.
 - 2. Where waterproofing membrane is indicated, install as recommended by manufacturer, and in accordance with applicable TCA Handbook Method_____.

3.05 INSTALLATION - FLOORS - MORTAR BED METHODS

- A. Over exterior concrete substrates, install in accordance with TCA F101, bonded, with grout as indicated in finish schedule on Drawings.
- B. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated.
 - 1. Where waterproofing membrane is indicated, with standard grout or no mention of grout type, install in accordance with TCNA (HB) Method F121.
 - 2. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F132, bonded.
 - 3. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F114, with cleavage membrane.
- C. Cleavage Membrane: Lap edges and ends.
- D. Mortar Bed Thickness: 5/8 inch (15.9 mm), unless otherwise indicated.

3.06 INSTALLATION - WALL TILE

- A. Over interior cementitious backer units on studs, install in accordance with The Tile Council of North America Handbook Method W244C, using waterproof membrane, and epoxy grout.
- B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.
- C. Over interior concrete and masonry install in accordance with The Tile Council of North America Handbook Method W202 thin-set with epoxy bond coat and grout.

3.07 CLEANING

- A. Clean tile and grout surfaces.

3.08 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

3.09 SCHEDULE

- A. See Finish Schedule on Drawings.

END OF SECTION

**SECTION 095100
ACOUSTICAL CEILINGS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.
- D. Perimeter Trim.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 072100 - Thermal Insulation: Acoustical insulation.
- C. Section 079005-Joint: Acoustical sealant.

1.03 REFERENCE STANDARDS

- A. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low Alloy with Improved Formability.
- B. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- C. ASTM A 653 (Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- E. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- F. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- G. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.
- I. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
- J. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
- K. ASTM C 1264 Classification for Acoustical Ceiling Products.
- L. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 6x6 inch (____x____ mm) in size illustrating material, edge detail and finish of acoustical units.
- E. Samples: Submit two samples each, 8 inches (____ mm) long, of suspension system main runner, cross runner, and perimeter molding.
- F. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
- G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- B. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.
 - 1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - 2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.
 - 3. Fire Resistance: As follows tested per ASTM E 119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory.
- C. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- E. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.08 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.
- B. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.09 WARRANTY

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
 1. Acoustical Panels: Sagging and warping
 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
 1. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is Thirty (30) years from date of substantial completion.
 2. Acoustical panels and grid systems with Humidity/Sag Resistant Treatment supplied by one source manufacturer shall be warranted for Thirty (30) years from date of substantial completion.
 3. Acoustical panels and grid systems with Humidity/Sag Resistant Treatment supplied by one source manufacturer shall be warranted for number of years as indicated for each product, from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
 1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.
 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.
- B. See Section 016000 - Product Requirements, for additional provisions.
- C. Deliver extra stock to Owner's representative.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 1. Armstrong World Industries, Inc; [Basis of Design]: www.armstrong.com.
 2. Substitutions: See Section 016000 - Product Requirements.
- B. Suspension Systems:
 1. Armstrong World Industries, Inc; [Basis of Design]: www.armstrong.com.
 - a. Contractors option to use preengineered SimpleSoffit and Drywall Grid in lieu of stud framing at window pockets, soffits, and clouds.
 2. Substitutions: See Section 016000 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Panels:
 1. As indicated on Ceiling Legend.
- B. -----

- C. ASTM E1264 Type A, Form A3 - Mineral fiber with scrubbable finish, typical in commercial kitchen/food prep areas.
- D. -----
- E. -----
- F. ASTM E1264 Type A, Form A4 - Mineral base with plastic or aluminum faced overlay; cleanroom classified option.
- G. -----
- H. -----
- I. ASTM E1264 Type J - Melamine foam tiles, planks, and panels.
- J. -----

2.03 SUSPENSION SYSTEMS

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
 - 1. Contractors option to use preengineered SimpleSoffit and Drywall Grid in lieu of stud framing at window pockets, soffits, and clouds.
- B. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
 - 1. Structural Classification: ASTM C 635 Intermediate Duty
 - 2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
- C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 12 gauge.
- E. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Products: 9/16" Suprafine, and 15/16" prelude XL: by Armstrong.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.
- C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
- D. Perimeter Moldings: Same metal and finish as grid.
- E. Acoustical Sealant For Perimeter Moldings: Specified in Section 079005.

- F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
 - 1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions, with authorities having jurisdiction, and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch (25 mm) movement. Maintain visual closure.
- K. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.
- L. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions. Comply with ASTM C 636 and with authorities having jurisdiction.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern parallel to longest room axis, unless indicated otherwise.
- D. Fit border trim neatly against abutting surfaces.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
 - 3. Double cut and field paint exposed reveal edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
- I. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
- J. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with new product to eliminate evidence of damage.

END OF SECTION

**SECTION 096500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 033000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021 (Reapproved 2025).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- E. Verification Samples: Submit one sample, 9 by 9 inch (____by____ mm) in size illustrating color and pattern for each resilient flooring product specified, and two 3 by 3 inch samples.
- F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: Provide minimum of 5% of each type and color.
 - 3. Extra Wall Base: Provide minimum of 5% of each type and color.
 - 4. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- B. Pre-Installation Testing: Conduct pre-installation testing as follows: Moisture tests, Bond test, and pH test.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Division 1 Product Requirements Sections.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - 1. Material should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational, controlled and set at a minimum of 68° F (20° C) for at least 48 hours prior to the installation.

1.08 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
- C. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 RESILIENT TILE FLOORING

- A. Luxury Vinyl Tile (LVT):
 - 1. Minimum Requirements: Comply with ASTM F 1700 Class III, Type B - Embossed Surface.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 3. Smoke Developed: 450 or less, when in accordance with ASTM E 662.
 - 4. Static Load Limit: 250 psi, when tested in accordance with ASTM F 970 (modified).
 - 5. Size: See Finish Legend.
 - 6. Durability: 0.125 inch - Very Good.
 - 7. Maintainability: 0.125 inch - Excellent.
 - 8. Resilience: 0.125 inch - Excellent.
 - 9. Manufacturer/ Style/ Color: See Finish Legend.
 - 10. Provide Acoustic Underlayment

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
 - 1. Manufacturers:
 - a. Roppe Corporation: www.roppe.com/#sle.
 - b. Tarkett Flooring: www.tarkett.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
 - 2. Height: See Finish Legend.
 - 3. Thickness: 0.125 inch (3.2 mm).
 - 4. Finish: As selected by Architect.
 - 5. Length: Roll.
 - 6. Color: As indicated on drawings.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Same material as flooring, except where indicated otherwise.
- D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.
- F. Confirm tiles are square and true. Cull all non-conforming tiles.

3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- B. Prohibit traffic until filler is fully cured.
- C. Clean substrate.
- D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's instructions. See finish plans for pattern and tile layout.
- C. Fit joints tightly. Window panes in tiles are not acceptable.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 72 inches (____ mm) 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.
- D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal, and wax resilient flooring in accordance with manufacturer's instructions, and also upon coordination with manufacturer's representative and Architect.
 - 1. Apply protective floor polish to VCT resilient flooring surfaces free from soil, excess adhesive or surface blemishes. Use commercially available, metal, cross-linked acrylic product acceptable to resilient flooring manufacturer.
 - a. Coordinate selection of floor polish with Owner and/or their maintenance service.
 - b. Buff floor tile and provide three (3) coats (in accordance with manufacturer's recommendations) of a protective floor polish at or near the point of substantial completion.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

3.08 SCHEDULE

- A. See Drawings.

END OF SECTION

SECTION 096723.20
DECORATIVE FLAKE RESINOUS FLOORING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes one resinous flooring system, one with epoxy body.
 - 1. Application Method: Squeegee, screed, and broadcast.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: For each resinous flooring system required, 5 inches (150 mm) square, applied to a rigid backing.
- C. Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on Drawings in product schedule.
- D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- E. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. No request for substitution shall be considered that would change the generic type of floor system specified (i.e. epoxy based flake broadcast with mortar coat). Equivalent materials of other manufactures may be substituted only on approval of Architect or Engineer. Request for substitution will only be considered only if submitted 10 days prior to bid date. Request will be subject to specification requirements described in this section.
- B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
 - 2. Contractor shall have completed at least 10 projects of similar size and complexity.
- C. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- D. Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.
 - 1. Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.

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- E. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 48-inch- (1200-mm-) square floor area selected by Architect.
 - a. Include 48-inch (1200-mm) length of integral cove base.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - F. Pre-installation Conference:
 - 1. General contractor shall arrange a meeting not less than thirty days prior to starting work.
 - 2. Attendance:
 - a. General Contractor
 - b. Architect/Owner's Representative.
 - c. Manufacturer/Installer's Representative: Kim Kersey 931.698.9613
 - 1) Kim.Kersey@stonhard.com

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects. Store material per product data sheet.
- C. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
 - 1. Maintain material and substrate temperature between 65 and 85 deg F (18 and 30 deg C) during resinous flooring application and for not less than 24 hours after application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.
- D. Concrete substrate shall be properly cured. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring

1.07 WARRANTY

- A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of (1) full years from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 PRODUCTS

2.01 RESINOUS FLOORING

- A. Available Products: Subject to compliance with requirements.

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1. Confirm inclusion of 25mil body coat, and broadcast quartz into primer increasing bond strength. Products that may be incorporated into the work include,
 - B. Products: Subject to compliance with requirements:
 1. Stonhard, Inc.; Stontec ERF®. Basis of Design.
 - C. System Characteristics:
 1. Color and Pattern: Refer to Finish Legend
 2. Wearing Surface: Standard
 3. Integral Cove Base: 4"
 4. Overall System Thickness: 2mm
 - D. System Components: Manufacturer's standard components that are compatible with each other and as follows:
 1. Primer:
 - a. Material Basis: Stonhard Standard Primer
 - b. Resin: Epoxy
 - c. Formulation Description: (2) two component 100 percent solids.
 - d. Application Method: Squeegee and roller.
 - e. Number of Coats: (1) one.
 - f. Aggregates: Broadcast quartz into wet primer coat.
 2. Body Coat(s):
 - a. Material Basis: Stonshield Undercoat.
 - b. Resin: Epoxy.
 - c. Formulation Description: (3) three component solvent free epoxy.
 - d. Application Method: Notched squeegee.
 - 1) Thickness of Coats: 25-30 mils with standard primer coat
 - 2) Number of Coats: (1) One.
 3. Broadcast:
 - a. Material Basis: Stontec Flakes
 - b. Formulation Description: Decorative flake (1/8")
 - c. Type: Tweed (chips to be mixed in Mfg. facility)
 - d. Finish: Broadcast to rejection.
 - e. Number of Coats: (1) one.
 4. Topcoat:
 - a. Material Basis: Stonkote CE4 with Stonseal SK6
 - b. Resin: Epoxy & Aliphatic, polyurethane/polyurea
 - c. Type: Clear.
 - d. Finish: Gloss. (see finish schedule for texture options)
 - e. Number of Coats: One Each.

Note: Components listed above are the basis of design intent; all bids will be compared to this standard including resin chemistry, color, wearing surface, thickness, and installation procedures, including number of coats. Contractor shall be required to comply with all the requirements of the Specifications and all of the components required by the Specifications, whether or not such products are specifically listed above.
 - E. System Physical Properties
 1. Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
 2. Tensile Strength: 5,200 psi per ASTM D-638
 3. Flexural Strength: 4,000 psi per ASTM D-790
 4. Flexural Modulus of Elasticity: 1.7×10^6 psi per ASTM D-790
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5. Hardness: .85 to .90 per ASTM D-2240, Shore D
6. Linear Coefficient of Thermal Expansion: 17×10^{-6} in./in. °F per ASTM C-531
7. Impact Resistance: Exceeds 160 in.-lbs. per ASTM D-4060, CS-17
8. Abrasion Resistance: 0.03 gm max. weight loss per ASTM D-4060, CS-17
9. Flammability: Class I per ASTM E-648

2.02 ACCESSORY MATERIALS

- A. Patching, Leveling and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated. No Single component or cementitious materials.
- B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean and dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 1. Mechanically prepare substrates as follows:
 - a. Mechanically prepare with the use of Diamond grinding equipment to provide surface sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring. Or,
 - b. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup or Diamond Grind with a dust free system.
 - c. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
 3. Verify that concrete substrates meet the following requirements.
 - a. Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 80 percent.
 - b. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab in 24 hours.
- C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- D. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for Stonflex MP7 joint fill material.

3.02 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
 - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates
- C. Broadcast: Immediately broadcast quartz silica aggregate into the primer using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.
- D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top coating of cove base. Round internal and external corners. Refer to detail drawings.
- E. Body coat: Mix base material according to manufacturer's recommended procedures. Uniformly spread mixed material over previously primed substrate using manufacturer's installation tool. Roll material with strict adherence to manufacturer's installation procedures and coverage rates.
- F. Broadcast: Immediately broadcast decorative flakes into the body coat. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.
- G. First Sealer: Remove excess un-bonded flakes by lightly brushing and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures.
- H. Second sealer: Lightly sand first sealer coat. Mix and apply second sealer coat with strict adherence to manufacturer's installation procedures.

3.03 TERMINATIONS

- A. Chase edges to "lock" the coating system into the concrete substrate along lines of termination.
- B. Penetration Treatment: Lap and seal coating onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
- C. Trenches: Continue coating system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.
- D. Treat floor drains by chasing the coating to lock in place at point of termination.

3.04 JOINTS AND CRACKS

- A. Treat control joints to bridge potential cracks and to maintain monolithic protection.
- B. Treat cold joints and construction joints to and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- C. Vertical and horizontal contraction and expansion joints are treated by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.05 FIELD QUALITY CONTROL

- A. Material Sampling: Owner may at any time and any numbers of times during resinous flooring application require material samples for testing for compliance with requirements.

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1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
 3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.06 CLEANING, PROTECTING, AND CURING

- A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.
- B. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection.
- C. Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer. General Contractor is responsible for cleaning prior to inspection.

END OF SECTION

**SECTION 096813
TILE CARPETING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 09 3000 - Tiling: Termination edging of adjacent floor finish.
- C. Section 09 6500 - Resilient Flooring: Rubber base, and transition strips.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout of joints.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Submit two, 12 inch (____ mm) long samples of edge strip, base cap, and stair nosing.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.04 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.

1.05 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. See Drawings for Manufacturer.
- B. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Tile Carpeting: Fusion bonded, unless indicated otherwise; manufactured in one color dye lot.
 - 1. Tile Size: As indicated on Finish Legend.
 - 2. Color: As indicated on Finish Legend.

3. Pattern: As indicated on Finish Legend.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum, or rubber, as selected; color as selected.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer, compatible with materials being adhered.
- D. Carpet Tile Adhesive: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

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 subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. 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. Locate change of color or pattern between rooms under door centerline.
- F. Fully adhere carpet tile
- G. Adhere carpet tiles using adhesive squares elsewhere.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.
- J. Fasten exposed edges of carpet to floor surface with trim at entire length of exposed edge.

3.04 CLEANING

- A. Clean and vacuum carpet surfaces.

END OF SECTION

**SECTION 099100
PAINTING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Exposed surfaces of steel lintels and ledge angles.
 - 3. Mechanical and Electrical:
 - a. In all areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated. See mechanical and electrical specifications for color coding of painted conduit, pipes, and accessories.
 - b. In all areas, paint shop-primed items.
 - c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, to match face panels.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Non-metallic roofing and flashing.
 - 6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
 - 7. Marble, granite, slate, and other natural stones.
 - 8. Floors, unless specifically so indicated.
 - 9. Ceramic and other tiles.
 - 10. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 11. Brick, and cast stone.
 - 12. Exterior insulation and finish system (EIFS).
 - 13. Glass.
 - 14. Acoustical materials, unless specifically so indicated.
 - 15. Concealed pipes, ducts, and conduits.
 - 16. Door hinges, hardware, or fire door labels.
 - 17. Rusty or corroded surfaces until sandblasted or wire-brushed free of corrosion, and wiped clean.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 03 3931 - Curing, Sealing, and Hardening Concrete Floors: Floor sealer, hardener, and densifier.

- C. Section 04 2000 - Unit Masonry Assemblies: Faces to be painted in this section.
- D. Section 05 5000 - Metal Fabrications: Shop-primed items.
- E. Section 08 1113 - Steel Doors and Frames: Shop-primed steel doors and frames.
- F. Section 09 2116 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.04 DEFINITIONS

- A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products and special coatings, including VOC content.
 - 1. List each material and cross reference to scheduled paint types, and including each specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
- C. Samples for initial color selection in the form of manufacturer's color charts from paint/coating manufacturer intended for use.
- D. Samples: Submit two paper chip samples, 4x8 inch in size illustrating range of colors available for each surface finishing product scheduled.
- E. Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- G. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- H. Applicator certifications that are required to be in writing.
- I. Submit Manufacture Representative reports as outlined in Field Quality Control below.
- J. Coating Maintenance Manual: Upon conclusion of the Project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as S-W "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product / color / finish was used, product data pages, Material Safety Data Sheet (MSDS), care and cleaning instructions, and Touch-up procedures.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

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- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.
 - C. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by paint manufacturer, and use only within the recommended limits.
 - D. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect of any problems anticipated using the materials specified, prior to proceeding with work.
 - E. Material Quality: Provide the manufacturer's best quality grade paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude approved equivalent products of other manufacturers.
 - F. Mock-Up: Provide mock-up at least 3 ft x 3 ft of general wall paint and trim for Architect's and Owner's review. Mock-Up guidelines as described in Section 01 4000 - Quality Requirements.
 - G. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
 - H. Lead content in pigments or other painting materials and components is not allowed.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, pigment and vehicle constituents by volume, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- D. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers, others present or passing through or inspecting work areas (painting or any other work), and the work areas themselves are protected from fire and health hazards resulting from handling, mixing, and application of materials.

1.09 PROJECT CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer, during application, drying and curing periods.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

- E. Minimum Application Temperature for solvent-thinned Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.10 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Supply 1 gallon of each color and type; store where directed.
- C. Label each container with color, type, and room locations in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
- B. Paints:
 - 1. Sherwin-Williams [Basis of Design]: www.sherwin-williams.com.
 - 2. Benjamin Moore & Co: www.benjaminmoore.com.
 - 3. PPG Architectural Finishes, Inc: www.ppgaf.com.
- C. Block Fillers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of State in which the project is located.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Colors: As indicated on drawings

1. In all areas, finish pipes, ducts, conduit, and equipment the colors as indicated on drawings. Refer to Finish Legend.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Concrete, Poured and Precast:
 1. One Coat: S-W: Loxon Concrete & Masonry Primer, A24W8300, (<100 g/l voc).
 2. Two Coats: S-W: SuperPaint Acrylic Exterior House Paint (Flat, A80-100 series) (Satin, A89-100 Series) (Gloss, A84-100 Series) - Architect to select finish required (<50 g/l voc).
- B. Masonry, Opaque, (One filler coat and two acrylic finish coats):
 1. One Coat: S-W: PrepRite Interior / Exterior Acrylic Block Filler, B25W25 (<50 g/l voc) (as required to be pinhole-free).
 2. Two Coats: S-W: SuperPaint Exterior Acrylic House Paint, Gloss, A84-100 Series (<50 g/l voc).
- C. Fiber Cement Board, Acrylic Primer and Paint, 3 Coat:
 1. One Coat: S-W: Loxon Latex Primer, A24 (if unprimed).
 2. Two Coats: S-W: A100 Exterior Acrylic House Paint, A82. More coats if needed to cover all fibering. Sheen: As selected from gloss or satin.
- D. Gypsum Board Soffit (Glass-mat faced), Acrylic Primer and Paint, 3 Coat:
 1. One Coat: S-W: Multi-Surface Interior/Exterior Acrylic Primer Sealer, B51W450.
 2. Two Coats: S-W: SuperPaint Acrylic Exterior House Paint (Flat, A80-100series) (Satin, A89-100 Series) (Gloss, A84-100 Series) - Architect to select finish required (<50g/l voc).
- E. Ferrous Metals, Unprimed, 100% Acrylic, 3 Coat:
 1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310 (<100 g/l voc).
 2. Two Coats: S-W: Sher-Cryl High Performance Acrylic, Gloss, B66-300 (<200 g/l voc).
- F. Ferrous Metals, Primed, Acrylic Latex, 2 Coat:
 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 2. Two Coats: S-W: Sher-Cryl High Performance Acrylic, Gloss, B66-100 (<200 g/l voc).
- G. Galvanized Metals, Acrylic, Opaque, 3 Coat:
 1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Metal Primer, B66-300 (<100 g/l voc).
 2. Two Coats: S-W: Sher-Cryl High Performance Semi-Gloss, B66-350 (<200 g/l voc).
- H. Wood, Stained.
 1. Two Coats: S-W: Woodscapes Exterior Waterborne Semi-Transparent Polyurethane Stain, A15T5 (for vertical use). -OR-
 2. Two Coats: S-W: SuperDeck S/T Waterborne Stain, 2650 Series.

2.04 PAINT SYSTEMS - INTERIOR

- A. //////////////NOTE: THERE ARE 3 KINDS OF EPOXY BELOW for EACH substrate of Concrete, Masonry, and Gyp. Pick the kinds needed (Precatalyzed, Water-based catalyzed, and Solvent-based), and adequately describe the extent of each, or be sure it is addressed on Finish Legend.//////////
- B. Concrete, Poured and Precast, Opaque, Acrylic, 3 coats.
 1. One Coat: S-W: Loxon Concrete & Masonry Primer, A24W8300 (<100 g/l voc).
 2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).
- C. Concrete, Epoxy 3 Coat System, (Pre-Catalyzed Water Based), (for Walls and Ceilings, Poured Concrete, Precast Concrete, Unglazed Brick, Cement Board, Tilt-Up, Cast-In-Place including Plaster Walls and Ceilings. Inside Face of Single-Wythe Exterior Concrete Block Walls; Rest Rooms, Laundry Rooms and other Wet Areas):

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1. One coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (8 mils wet, 3.2 mils dry).
 2. Semi-Gloss: Two coats of S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46-Series. (4 mils wet, 1.5 mils dry per coat).
- D. Masonry, Opaque, Latex, 3 Coat:
1. One Coat: S-W: Pro Industrial Heavy Duty Block Filler, B42W150. (Required to be pin-hole free).
 2. Two Coats: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).
- E. Masonry, Epoxy 3 Coat System, (Water Based Catalyzed), (for CMU - Concrete, Split Face, Scored, Smooth, High Density, Low Density, Fluted, Stucco; Toilets and other Wet Areas):
1. One coat: S-W Heavy Duty Block Filler, B42W46 (18.0-34.0 mils wet, 10.0-18.0 mils dry).
 2. Gloss: Two coats: S-W Pro Industrial Water Based Catalyzed Epoxy Gloss, B73-300 Series (5.0-10.0 mils wet, 2.0-4.0 mils dry per coat). -or-
 3. Eg-Shel/Low Luster Finish: Two coats: S-W Pro Industrial Water Based Catalyzed Epoxy Eg-Shel, B73-360 Series. (5.0-10.0 mils wet, 2.0-4.0 mils dry per coat)
- F. Ferrous Metals, Unprimed, Acrylic, 3 Coat:
1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-310 (<100 g/l voc).
 2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).
- G. Ferrous Metals, Acrylic Primed, Acrylic-Alkyd Finish, 2 Coat:
1. One Coat: Touch up with primer: S-W: Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-310 (<100 g/l voc).
 2. Two Coats: S-W ProMar 200 Interior Waterbased Acrylic-Alkyd Semi-Gloss B34-8200 Series.
- H. Galvanized Metals, Acrylic, 3 Coat:
1. One Coat: S-W: Pro Industrial Pro-Cryl Universal Primer, B66-310 (<100 g/l voc).
 2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 (0 g/l voc).
- I. Gypsum Board/Plaster, Latex-Acrylic, 3 Coat (for Offices, etc.):
1. One Coat: S-W: ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (0 g/l voc).
 2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex EgShel, B20-2600 (0 g/l voc).
(Where Sheen is indicated "Gloss", provide Pro Industrial™ High Performance Acrylic, B66-600 Series, <50 g/l voc).
- J. Gypsum Board, Epoxy 3 Coat System, (Pre-Catalyzed Water-Based), (for Toilets, Laundry Rooms, Weight Rooms, etc.):
1. One coat: S-W ProMar 200 Zero VOC Latex Primer, B28W02600 (4 mils wet, 1.0 mils dry).
 2. Semi-gloss: Two coats of S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss, K46- Series. (4 mils wet, 1.5 mils dry per coat). -or-
 3. Eg-Shel: Two coats of S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy Eg-Shel, K46-Series. (4 mils wet, 1.5 mils dry per coat).
- K. Gypsum Board, Epoxy 3 Coat System, (Water Based Catalyzed), (for Kitchens, Rest Rooms, Wet Areas, etc.):
1. One coat: S-W ProMar 200 Zero VOC Latex Primer, B28W02600 (4 mils wet, 1.0 mils dry).
 2. Gloss Finish: Two coats of S-W Pro Industrial Water Based Catalyzed Epoxy Gloss, B73-300 Series (5.0-10.0 mils wet, 2.0-4.0 mils dry per coat). -or-
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3. Eg-Shel Finish: Two coats of S-W Pro Industrial Water Based Catalyzed Epoxy Eg-Shel, B73-360 Series (5.0-10.0 mils wet, 2.0-4.0 mils dry per coat).
- L. Wood, Opaque, Acrylic Latex, 3 Coat:
 1. One Coat: S-W: Multi-Purpose Interior / Exterior Latex Primer /Sealer, B51-450 Series (<50 g/l voc).
 2. Two Coats: S-W: ProMar 200 Zero VOC Interior Latex EgShel Enamel, B20-2600 (0 g/l voc).
 - M. Wood, Opaque, Acrylic-Alkyd, 3 Coat:
 1. One Coat: Primer - As recommended by manufacturer.
 2. Two Coats: S-W ProMar 200 Interior Waterbased Acrylic-Alkyd.
 - N. Wood, Transparent, Varnish, Stain:
 1. Filler coat: S-W: As required.
 2. One coat of stain; S-W: WoodClassics "250" Interior Wood Stain, A49-800 Series (<250 g/l voc). Option: S-W: MinWax "250" VOC Stain (<250 g/l voc).
 3. Two coats; S-W: WoodClassics Waterbased Polyurethane, A68 Series (<350 g/l voc). Option: MinWax Waterbased Polyurethane Varnish: Satin (710337), Semi-Gloss (710320), Gloss (710313) (<350 g/l voc).

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
- E. All surfaces to be pinhole free.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

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- E. Seal surfaces that might cause bleed through or staining of topcoat.
 - F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
 - G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
 - H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
 - I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
 - J. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
 - K. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
 - L. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
 - M. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
 - N. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
 - O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Identify fire walls, smoke barriers, etc., in accessible concealed floor, floor-ceiling or attic spaces, by stenciling "X-HOUR FIRE AND/OR SMOKE BARRIER" in 3-inch high contrasting letters, 3/8-inch minimum stroke. Locate within 15 feet of end of wall, and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Apply products in accordance with manufacturer's instructions.
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance.
- G. All surfaces shall be pinhole-free.
- H. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- I. Sand wood and metal surfaces lightly between coats to achieve required finish.

- J. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- K. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- L. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to Division 23 and 26 Sections for scheduling of color coding of equipment, duct work, piping, and conduit.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.
- B. Architect shall approve surface prior to finish coats being applied.
- C. Manufacturers Representative shall visit the site a minimum of 3 times. These visits shall be at the beginning, middle and completion of work.
 - 1. The beginning visit shall review the substrate for compliance prior to installation and for appropriate use of products.
 - 2. The middle visit shall review the progress and performance of the installer.
 - 3. The final visit shall review the quality of the final product.
 - 4. The manufacturer shall submit reports to the Contractor and the Architect within 72 hours of each visit. The letter shall document observations, instructions to Contractor, and any remediations required and/or completed.

3.06 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean paint from all electrical devices, mechanical devices, door hardware, architectural items, and other permanent materials.

3.07 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

3.08 SCHEDULE - SURFACES TO BE FINISHED

- A. Paint the surfaces described in PART 2, Paint Systems Articles.

3.09 SCHEDULE - PAINT SYSTEMS

- A. Concrete, Poured and Precast: Finish all surfaces exposed to view, unless indicated otherwise.
 - 1. Exterior: Acrylic house paint, 3-coat, Finish - As selected, or scheduled.
 - 2. Interior: Acrylic latex enamel, 3-coat, Semi-gloss.
 - 3. Interior: Epoxy (Pre-Catalyzed), 3-coat, Semi-gloss.
 - 4. Interior: Epoxy (Water-based Catalyzed), 2-coat, Finish - As selected or scheduled.
- B. Masonry (Concrete Block): Finish all surfaces exposed to view.
 - 1. Exterior: Acrylic, Block filler & House paint, 3-coat, Gloss.
 - 2. Interior: Latex, Block filler & Enamel, 3-coat, Finish - As selected or scheduled.

3. Interior: Epoxy (Pre-Catalyzed), 3-coat, Semi-gloss.
 4. Interior: Epoxy (Water-based Catalyzed), Finish - As selected or scheduled.
- C. Steel Doors and Frames: Finish all surfaces exposed to view.
1. Exterior: Acrylic, Primer & 2-coat, Gloss or Semi-gloss.
 2. Interior: Acrylic, Primer & 2-coat, Semi-gloss.
- D. Steel Fabrications: Finish all surfaces exposed to view.
1. Exterior: Acrylic, Primer & 2-coat, Gloss or Semi-gloss, as selected; finish all surfaces, including concealed surfaces, before installation.
 2. Interior: Acrylic, Primer & 2-coat, Semi-gloss.
- E. Galvanized Steel: Finish all surfaces exposed to view.
1. Exterior: Acrylic, Primer & 2-coat, Semi-gloss.
 2. Interior: Acrylic, Primer & 2-coat Enamel, Semi-gloss.
- F. Gypsum Board: Finish all surfaces exposed to view.
1. Exterior: Glass mat faced soffit: Acrylic, 3-coat, Finish - As selected or scheduled.
 2. Interior Ceilings and Walls: Latex Acrylic, 3-coat, Eggshell (Except gloss, where indicated).
 3. Interior Walls and Gyp Bd Ceilings in Wet Areas: Epoxy (Pre-Catalyzed) , 3-coat, Finish - As selected or scheduled.
- G. Fiber Cement Board: Acrylic, 3-coat, Finish - As selected or scheduled (Gloss or Satin).
- H. Wood: Finish all surfaces exposed to view.
1. Exterior: Semi-Transparent Stain, 2-coats.
 2. Interior trim and frames: Opaque, Acrylic Latex Enamel, 3-coat, Eggshell.
 3. Interior trim: Transparent, Polyurethane Varnish Stain, 3-coat, Finish - As selected or scheduled.

END OF SECTION

**SECTION 099113
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. Exposed surfaces of steel lintels and ledge angles.
 - 2. Mechanical and Electrical:
 - a. On the roof and outdoors, paint equipment exposed to weather or to view, including factory-finished materials.
- 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.
 - 8. Metal wall panels, fascias, coping, soffits, and down spouts.

1.02 RELATED REQUIREMENTS

- A. Section 055000 - Metal Fabrications: Shop-primed items.
- B. Section 099123 - Interior Painting.
- C. Section 210553 - Identification for Fire Suppression Piping and Equipment: Painted identification.
- D. Section 220553 - Identification for Plumbing Piping and Equipment: Painted identification.
- E. Section 230553 - Identification for HVAC Piping and Equipment: Painted identification.
- F. Section 260553 - Identification for Electrical Systems: Painted identification.
- G. Section 321723 - Pavement Markings: Painted pavement markings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2024.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- D. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 2024.
- E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- F. SSPC-SP 2 - Hand Tool Cleaning; 2024.
- G. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.

1.04 SUBMITTALS

- A. See Section 013000 - 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 (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

1.05 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 5 years experience and approved by manufacturer.

1.06 MOCK-UPS

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the work.

1.07 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 (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) 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. Behr Paint Company; _____: www.behr.com/#sle.
 - 2. Pittsburgh Paints; _____: www.ppgpaints.com/#sle.
 - 3. Sherwin-Williams Company; _____: www.sherwin-williams.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 016000 - 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete and primed metal.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
 - 3. Top Coat(s): Exterior Waterborne Urethane Alkyd; MPI #157, 167 or 168.
 - 4. Top Coat Sheen:
 - a. Velvet: MPI gloss level 2; use this sheen at all locations.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Alkali-Resistant Water-Based Primer; MPI #3.
 - a. Products:
 - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #3)
 - 2) Pittsburgh Paints Series Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series. (MPI #3)
 - 3) Sherwin-Williams Loxon Water Blocking Primer/Finish.
 - 4) Substitutions: See Section 016000 - Product Requirements

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 affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.

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 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.
- F. Concrete:
- G. 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.
- H. 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 in accordance with SSPC-SP 6/NACE No.3. Protect from corrosion until coated.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- 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.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. 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.

END OF SECTION

**SECTION 099123
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.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, 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. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 055000 - Metal Fabrications: Shop-primed items.
- B. Section 099113 - Exterior Painting.
- C. Section 210553 - Identification for Fire Suppression Piping and Equipment: Painted identification.
- D. Section 220553 - Identification for Plumbing Piping and Equipment: Painted identification.
- E. Section 230553 - Identification for HVAC Piping and Equipment: Painted identification.
- F. Section 260553 - Identification for Electrical Systems: Painted identification.
- G. Section 321723 - Pavement Markings: Painted pavement markings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.
- B. ASTM 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. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).

- F. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 2024.
- G. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- H. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.

1.04 SUBMITTALS

- A. See Section 013000 - 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 products to be used in project; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gal (4 L) of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.05 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 5 years experience and approved by manufacturer.

1.06 MOCK-UP

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 4 feet (____ m) long by 4 feet (____ m) wide, illustrating paint color, texture, and finish.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.

1.07 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 (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.08 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. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
- D. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
- B. Paints:
 - 1. Behr Paint Company: www.behr.com/#sle.
 - 2. Pittsburgh Paints: www.ppgpaints.com/#sle.
 - 3. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 016000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. 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:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. SCAQMD 1113 Rule.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.
 - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, shop primed steel, and galvanized steel.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
 - 3. Top Coat Sheen:

- a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
- b. Eggshell: MPI gloss level 3; use this sheen for CMU walls.
- c. Semi-Gloss: MPI gloss level 5; use this sheen for hollow metal door frames and in wet areas, bathrooms, showers, toilet rooms and laundry.
4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
 1. Medium duty applications include doors, door frames, railings, and handrails.
 2. Two top coats and one coat primer.
- C. Paint I-OP-MD-WC - Medium Duty Vertical and Overhead: Including gypsum board, concrete, concrete masonry units, uncoated steel, shop primed steel, and galvanized steel, all exposed items in apparatus bay ceiling.
 1. Two top coats and one coat primer.
 2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 1. Alkali Resistant Water Based Primer; MPI #3.
 - a. Products:
 - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #3)
 - 2) Pittsburgh Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series. (MPI #3)
 - 3) Sherwin-Williams Loxon Water Blocking Primer/Finish.
 - 4) Substitutions: See Section 016000 - Product Requirements
 2. Interior/Exterior Latex Block Filler; MPI #4.
 - a. Products:
 - 1) Behr Pro Block Filler Primer [No.PR050]. (MPI #4)
 - 2) Pittsburgh Paints; Perma-Crete Concrete Block & Masonry Surfacer/Filler, 4-100XI. (MPI #4)
 - 3) Sherwin-Williams Loxon Block Surfacer. (MPI #4)
 - 4) Substitutions: See Section 016000 - Product Requirements
 3. Interior Drywall Primer Sealer.
 - a. Products:
 - 1) Behr Premium Plus Interior Drywall Primer and Sealer [No.73].
 - 2) Pittsburgh Paints Speedhide Pro-EV Zero Latex Sealer, 12-900XI.
 - 3) Substitutions: See Section 016000 - Product Requirements
 4. Anti-Corrosive Alkyd Primer for Metal; MPI #79.
 - a. Products:
 - 1) Pittsburgh Paints Speedhide LV Rust-Inhibitive Alkyd Metal Primer, 6-208N Series. (MPI #79)
 - 2) Substitutions: See Section 016000 - Product Requirements

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. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- F. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
- G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- I. 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 in accordance with SSPC-SP 6/NACE No.3. Protect from corrosion until coated.
- J. 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.
- K. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.
- L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- 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. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 099300
STAINING AND TRANSPARENT FINISHING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Field application of stains.

1.02 RELATED REQUIREMENTS

- A. Section 099113 - Exterior Painting: Stains and transparent finishes for concrete substrates.
- B. Section 099123 - Interior Painting: Stains and transparent finishes for concrete substrates.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.
- C. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2020.
- D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- F. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).

1.04 SUBMITTALS

- A. See Section 013000 - 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 catalog number, and general product category.
 - 2. Manufacturer's installation instructions.
- C. Samples: Two samples on _____, 4 by 4 inch (____ by ____ mm) in size, indicating selected colors and sheens for each system, with specified coats cascaded.
- D. Manufacturer's Qualification Statement.
- E. Applicator's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with at least three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

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 stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

-
- C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), 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 manufacturer of stains and transparent finishes.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperature: 50 degrees F (10 degrees C) unless required otherwise by manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Stains:
 - 1. Pittsburgh Paints; _____: www.ppgpaints.com/#sle.
 - 2. Sherwin-Williams Company; _____: www.sherwin-williams.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 STAINS AND TRANSPARENT FINISHES - GENERAL

- A. Finishes:
 - 1. Provide finishes 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 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 finish material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
 - B. Volatile Organic Compound (VOC) Content:
 - 1. Provide stains and transparent finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. SCAQMD 1113 Rule.
 - c. CARB (SCM).
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
 - C. Flammability: Comply with applicable code for surface burning characteristics.
 - D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
 - E. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.
 - 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
-

2.03 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

- A. Finish on Wood - Doors:
 - 1. Stain: Semi-transparent stain for wood, water based with polyurethane.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of stains 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. 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. Wood: 15 percent, measured in accordance with ASTM D4442.

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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.

3.03 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 in thicknesses specified by manufacturer.
- D. Reinstall items 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.

END OF SECTION

**SECTION 099723
CONCRETE AND MASONRY COATINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Moisture resistant smooth concrete and masonry coatings.

1.02 RELATED REQUIREMENTS

- A. Section 099113 - Exterior Painting.

1.03 REFERENCE STANDARDS

- A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.
- B. ASTM D1653 - Standard Test Methods for Water Vapor Transmission of Organic Coating Films; 2013 (Reapproved 2021).
- C. ASTM D2243 - Standard Test Method for Freeze-Thaw Resistance of Water-Borne Coatings; 2020.
- D. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity; 2025.
- E. ASTM D6904 - Standard Practice for Resistance to Wind-Driven Rain for Exterior Coatings Applied on Masonry; 2003 (Reapproved 2022).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- H. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013 (Reapproved 2021).
- I. ASTM G155 - Standard Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials; 2021.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating coating materials and _____.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include cleaning procedures and repair and patching techniques.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.06 FIELD CONDITIONS

- A. Do not install materials when temperature is below 55 degrees F (13 degrees C) or above 90 degrees F (32 degrees C).
- B. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.

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- C. Restrict traffic from area where coating is being applied or is curing.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Concrete and Masonry Coatings:
 - 1. Sto Corp; _____: www.stocorp.com/#sle.
 - 2. Substitutions: Section 016000 - Product Requirements.

2.02 CONCRETE AND MASONRY COATINGS

- A. Provide high-build, weather resistant coating systems that meet the following minimum performance criteria, unless more stringent criteria are specified:
 - 1. Salt Spray Resistance: Passes when tested according to ASTM B117 for 2000 hours.
 - 2. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0, maximum, when tested in accordance with ASTM E84.
 - 3. Accelerated Outdoor Exposure: Passes when tested according to ASTM G153 for 5,000 hours.

2.03 MATERIALS

- A. Coatings - General: Provide complete systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated.
 - 1. Maximum volatile organic compound (VOC) content: As required by applicable regulations.
- B. Water Based Super-Hydrophobic Smooth Coating: Single component acrylic coating, color pigments, and acrylic polymer.
 - 1. Dry Film Thickness: 2.5 mils (0.063 mm) minimum, per coat.
 - 2. Accelerated Weathering: Tested in accordance with ASTM G155; 2,000 hours with no deleterious effects.
 - 3. Water Vapor Transmission: ASTM E96/E96M; 40 perms (2280 ng/Pa s sq m), maximum.
 - 4. Color: Clear.
 - 5. Manufacturers:
 - a. Sto Corp; StoColor Lotusan: www.stocorp.com/#sle.
 - b. PPG Paints: www.ppgpaints.com
 - c. Tremco Commercial Sealants: www.tremcosealants.com
 - d. Substitutions: Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. 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.
- C. Masonry: Verify masonry joints are struck flush.

3.02 PREPARATION

- A. Clean surfaces of loose foreign matter.
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- B. Remove substances that would bleed through finished coatings.
- 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 instructions, to thicknesses specified.
- 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 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.

3.06 PROTECTION

- A. Protect finished work from damage.

END OF SECTION

**SECTION 101100
VISUAL DISPLAY UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass markerboards.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.
- B. Section 04 2000 - Unit Masonry.
- C. Section 061000 - Rough Carpentry: Blocking and supports.
- D. Section 092116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.
- E. Section 092216 - Non-Structural Metal Framing: Concealed supports in metal stud walls.
- F. Section 09 9100 - Painting.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI A135.4 - Basic Hardboard; 2012 (Reaffirmed 2020).
- C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- D. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2025.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- G. PS 1 - Structural Plywood; 2023.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on glass markerboard and trim.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations , special anchor details.
- D. Samples: Color charts for selection of color and texture of glass markerboard and trim.
- E. Manufacturer's printed installation instructions.
- F. Maintenance Data: Include data on regular cleaning, stain removal .

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 VISUAL DISPLAY UNITS

- A. Magnetic Glass Markerboards:
 - 1. Glass: Laminated, low iron, 1/4 inch thick (6 mm thick), with bevel edges and radiused corners, laminated to steel backing sheet for use with magnets. Coated or treated for use as dry erase board or projection surface.
 - 2. Steel Backing Sheet Thickness: 24 gauge, 0.0239 inch (0.61 mm).
 - 3. Mounting: Concealed Z clips.

2.02 MATERIALS

- A. Float Glass: Provide float-glass-based glazing unless otherwise indicated.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 - 1. Laminated Safety Glass: Comply with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.03 ACCESSORIES

- A. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.
- B. Temporary Protective Cover: Sheet polyethylene, 8 mil (0.2 mm) thick.
- C. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.
- D. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.
- C. Verify flat wall surface for frameless adhesive-applied boards.

3.02 PREPARATION

- A. Acclimatize tackable wall panels by removing from packaging in installation area not less than 24 hours before application.
- B. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install with top of marker tray at 30 inches (760 mm) above finished floor.
- C. Secure units level and plumb.

3.04 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

**SECTION 101400
SIGNAGE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Roof Identification Sign.
- C. Luminous egress path marking and other luminescent signage.
- D. Emergency evacuation maps as required by OSHA.
- E. Building identification signs.
- F. Occupancy limit sign.
- G. Vinyl Signs

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Detail of Project Plaque in General Conditions section of Project Manual.
- C. Section 01 5813 – Temporary Project Signage.
- D. Section 04 2000 - Unit Masonry Assemblies.
- E. Section 09 2116 - Gypsum Board Assemblies.
- F. Division 22 & 23 - Mechanical Identification.
- G. Division 26 - Electrical Identification.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (ADA Standards for Accessible Design).
- B. ADA Standards – Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.
- D. ASTM E2072 – Standard Specification for Photoluminescent (Phosphorescent) Safety markings; 2014
- E. ICC A117.1 – Accessible and Usable Buildings and Facilities; 2017.
- F. NFPA 170 – Standard for Fire Safety and Emergency Symbols; 2018.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.

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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. Shop Drawings: Submit shop drawings of each type of sign.
- E. 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.
- F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- G. Verification Samples: Submit 1 sample of each type of sign, in finish as selected.
- H. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000-Product Requirements, for additional provisions.
 2. Curved Sign Inserts: One extra blank insert per sign for Owner's use.
 3. Curved Sign Media Suction Cups: Provide 12 suction cups for Owner's use, for removal of clear lens on curved frame signage to change graphic background.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

1.08 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image (for panel signage).
 - c. Separation or delamination of sheet materials and components.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs (Exterior Doors, Life Safety, and Roof ID Sign):
1. 2/90 Sign Systems: www.290signs.com.
 2. APCO Signs: www.apcosigns.com.
 3. Best Sign Systems, Inc: www.bestsigns.com.
 4. Seton Identification Products: www.seton.com/aec.
 5. Substitutions: See Section 01 6000 - Product Requirements.

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- B. Dimensional Letter Signs:
 - 1. Andco Industries Corp.
 - 2. Gemini, Inc.
 - 3. Leeds Architectural Letters, Inc.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
 - C. Photoluminescent Marking and Signage:
 - 1. Ecoglo, Inc; Guidance Strips: www.us.ecoglo.com.
 - 2. Nystrom, Inc: www.nystrom.com/#sle.
 - 3. Safe-T-Nose, LLC;(Basis of Design): www.safetnose.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
 - D. Plaques
 - 1. Impact Signs, Inc.: <https://www.impactsigns.com>
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATIONS AND TYPES

- A. Accessibility Compliance: All signs are required to comply with ADA Standards for Accessible Design and ANSI/ICC A 117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Interior Door Signs: Provide a sign for every door or cased opening to room, not including corridor, lobbies or similar open areas. Reference door schedule and floor plans.
 - 1. Sign Type: Curved signs with engraved removable panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Use ADA Insert Panel, as specified.
 - 4. Character Height: As indicated, or selected.
 - 5. Sign Sizes: See drawings.
 - 6. Room Doors: Submit sign schedule with room numbers and room names shown on the drawings. Provide column to show final room names and numbers to be confirmed during submittal process.
 - 7. Rest Rooms: Identify with raised pictograms, for "MEN", "WOMEN", ADA accessibility symbol, raised letters and braille, as required and/or indicated on drawings.
 - a. Sign Sizes: See drawings.
 - 8. Transparent Insert: Printable on common ink-jet or laser printer. Provide one (1) printed insert per sign based on occupant list to be provided at later date. Provide one (1) extra blank insert per door.
 - 9. Opaque Insert: Provide up to six (6) options for background graphic design based on color and direction to be provided by Architect at later date.
- C. Flat Signs: Signage media without frame.
 - 1. Size: As noted in sign type drawing.
 - 2. Provide "tactile" signage with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Material: Interior signage: Photopolymer.
 - 4. Edges: Square, unless indicated otherwise.
 - 5. Corners: Square, unless indicated otherwise.
 - 6. Wall Mounting of One-Sided Signs: Tape adhesive at interior doors, exterior door signage to be mechanically mounted.
- D. Luminous Egress Path Marking and Other Luminescent Signs: Photoluminescent media.
 - 1. Provide luminous egress path marking as required by local authority having jurisdiction.
- E. Emergency Evacuation Maps (As required by OSHA):

1. Allow for three (3) maps per floor or as indicated on drawings.
 2. Size: 11" x 17".
 3. Mount with stainless steel stand-offs. 5/8" x5/8".
 4. Evacuation maps shall have a unique "you are here" orientation as well as two emergency egress paths. The maps shall show location of fire extinguishers, fire pulls, stairwells, elevators and restrooms.
 5. Floor plans, locations of equipment and egress paths for map to be provided by Architect. Graphic artwork to be provided by Signage provider.
- F. Building Dimensional Letters - Cast Metal:
1. Use individual, pin mounted metal letters.
 - a. Color: As selected by Architect.
 2. Mount in location shown on drawings.
- G. Vinyl Signs: Durable adhesive vinyl for installation inside glass at public entrances and customer service areas.
1. Copy to be determined during submittal.
- H. Exterior Door Signage: Flat panel, metal (in silver or aluminum color), or satin aluminum metal background, with raised black lettering. Sign size: 6" x 8", 1/8" thick, unless indicated otherwise on drawings.
1. Mount with mechanical fasteners.
- I. All Signs (unless otherwise indicated):
1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: To Be Determined.
 4. Character Color: Contrasting color, to be selected by Architect.
- J. Glass-Applied Signage: Plates at back of solid signs; or vinyl opaque film - as noted.

2.03 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
1. Total Thickness: 1/8 inch.
 2. Panel Edges: Square or as indicated in drawings.
 3. Panel Corners: Square or as indicated in drawings.

2.04 NON-TACTILE SIGNAGE MEDIA

- A. Photoluminescent Media: Sheet aluminum with photoluminescent pigmented material bonded to surface, not requiring electrical power to glow in the dark for several hours.
1. Tested and listed for compliance with UL 1994.
 2. Color: As selected.
 3. Mounting: Adhesive applied.
 4. Outlining Strips: 1 inch wide, minimum.
- B. Printed Inserts:
1. The signage shall be capable of accepting paper or acetate inserts to allow changing and updating as required. Insert components shall have a 0.080" thickness non-glare acrylic window and shall be inlaid flush to sign face for a smooth, seamless appearance.
 2. The signage contractor shall provide and install all signage inserts.
 3. Manufacturer shall provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink jet printer. The template shall be in an Acrobat or Word format (.pdf and/or .doc). Reference door schedule and floor plans.

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- C. Digitally printed or Silk Screened Plastic Panels: Letters and graphics applied onto reverse side of acrylic polymer surface:
 - 1. Sign Color:
 - a. Front: Clear with matte non-glare finish.
 - b. Back: Solid color as selected by Architect from manufacturer's standard colors.
 - 2. Total Thickness: 1/4 inch.

2.05 PLAQUES

- A. Plaques: Where located in drawings.
 - 1. 24x36 Glass Plaques: Where located on drawings.

2.06 DIMENSIONAL LETTERS

- A. Metal Letters: Letters shall be cast from 319 aluminum alloy and finished with two (2) coats of baked enamel finish. Color to be selected by Architect.
 - 1. Size:
 - a. Exterior Building Letters: Height 20", Depth 1-1/2".
 - b. Interior Building Letters: Height 8", Depth 1/2". Reference elevations.
 - 2. Metal: Aluminum casting.
 - 3. Finish: To be determined during submittal.
 - 4. Font: As selected by Architect, with approval of Owner.
 - 5. Mounting: Concealed , pin mounted.

2.07 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

- 1. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
 - 1. Room and Door Signs: Locate on wall at latch side of door with top edge of sign at 60 inches above finished floor or as indicated in Architect's drawings.
 - 2. If no location is indicated obtain Architect's instructions.
- D. Building Lettering: Mount letters onto building using the standard method recommended by the manufacturer for the type of surface indicated.
 - 1. Concealed Mounting: Unless recommended otherwise by manufacturer, mount the letters by inserting threaded studs into tapped lugs on the back of the letters. Set in pre-drilled holes filled with quick-setting cement.

3.03 PROTECTION

- A. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

**SECTION 101416
PLAQUES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plaques.

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 - 2010 ADA Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's product literature for each type of plaque sign, indicating style, font, foreground and background colors, locations, and overall dimensions of each sign.
- C. Shop Drawings: Indicate dimensions, locations, elevations, materials, text and graphic layout, and attachment details.
- D. Manufacturer's qualification statement.

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 plaque signs as required to prevent damage before installation.
- B. Store under cover and elevated above grade.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plaques:
 - 1. FASTSIGNS International, Inc; _____: www.fastsigns.com/#sle.
 - 2. Takeform; _____: www.takeform.net/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 REGULATORY REQUIREMENTS

- A. Accessibility Requirements: 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 restrictive requirements.

2.03 PLAQUES

- A. Metal Plaques:
 - 1. Material: Bronze casting.
 - 2. Material Thickness: 1/8 inch (3 mm), minimum.
 - 3. Size: 20 inches by 30 inches (_____ mm by _____ mm).
 - 4. Text and Typeface:
 - a. Character Font: Helvetica, Arial, or other sans serif font.
 - b. Character Case: Upper and lower case (title case).
 - c. Character Color: Contrast with background color.

5. Surface Finish: Brushed, satin.
6. Painted Background Color: Light oxide stain.
7. Protective Coating: Manufacturer's standard clear coating.
8. Mounting: Rosettes and toggle bolts.

2.04 ACCESSORIES

- A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, or other.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.
- C. Protect from damage until mm-dd-yyyy; repair or replace damaged items.

END OF SECTION

**SECTION 101419
DIMENSIONAL LETTER SIGNAGE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dimensional letter signage.

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 - 2010 ADA Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's product literature for each type of dimensional letter sign, indicating style, font, colors, locations, and overall dimensions of each sign.
- C. Shop Drawings:
 - 1. Include dimensions, locations, elevations, materials, text and graphic layout, and attachment details.
 - 2. Show locations of electrical service connections.
- D. Samples: Submit one sample of each type of dimensional letter sign of size similar to that required for project, indicating sign style, font, and method of attachment.
- E. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- F. Manufacturer's qualification statement.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package dimensional letter signs as required to prevent damage before installation.
- B. Store under cover and elevated above grade.

1.05 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Dimensional Letter Signs:
 - 1. FASTSIGNS International, Inc; _____: www.fastsigns.com/#sle.
 - 2. Takeform; _____: www.takeform.net/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 REGULATORY REQUIREMENTS

- A. Accessibility Requirements: 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 restrictive requirements.

2.03 DIMENSIONAL LETTERS

- A. Applications: Building identification.

1. Use individual metal letters.
- B. Metal Letters:
 1. Material: Aluminum sheet, flat.
 2. Thickness: 1/8 inch minimum (3 mm).
 3. Letter Height: 12 inches (_____ mm).
 4. Text and Typeface:
 - a. Character Font: Helvetica, Arial, or other sans serif font.
 5. Finish: Anodized.
 6. Color: As selected.
 7. Mounting: Concealed screws.

2.04 ACCESSORIES

- A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, or other.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that electrical service is correctly sized and located to accommodate dimensional letter signs.
- C. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.
- C. Locate dimensional letter signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until mm-dd-yyyy; repair or replace damaged items.

END OF SECTION

**SECTION 102600
WALL AND DOOR PROTECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.
- B. Protective wall covering.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Blocking for wall and corner guard anchors.
- B. Section 087100 - Door Hardware: Standard protection plates and trim.
- C. Section 092116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2023, with Editorial Revision.
- C. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- F. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

1.04 SUBMITTALS

- A. See Section 013000 - 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 one sections of corner guards, 12 inches (____ mm) long.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Stock Materials: Five of each kind of corner guards.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Protect work from UV light damage.
- D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.
- E. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty for metal crash rails. Complete forms in Owner's name and register with manufacturer.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures or internal connection failures.
 - b. Deterioration of materials beyond that expected of normal use, as intended by manufacturer.
- C. Installer Warranty: Provide 5-year warranty for metal crash rails commencing on Date of Substantial Completion. Complete forms in Owner's name and register with installer.
 - 1. Failures include, but are not limited to, the following:
 - a. Detachment of rail system from substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Corner Guards:
 - 1. Basis of Design: Inpro 160BN high impact corner guard: www.inprocorp.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Protective Wall Covering:
 - 1. Inpro; _____: www.inprocorp.com/#sle. - Refer to Finish Legend.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE CRITERIA

- A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.
- B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.
- C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.03 PRODUCT TYPES

- A. Corner Guards - Flush Mounted:
 - 1. Material: High impact vinyl with full height extruded aluminum retainer.

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2. Fire Resistance: Where fire rating is specified for the wall in which the guard is mounted, provide assemblies that have been tested in accordance with ASTM E119 for the same rating as the wall.
 3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 4. Width of Wings: 2 inches (51 mm).
 5. Corner: Square.
 6. Length: To ceiling as indicated.
- B. Protective Wall Covering:
1. Thickness: 0.040 inch (1.02 mm).
 2. Color: As selected from manufacturer's standard colors.

2.04 FABRICATION

- A. Fabricate components with tight joints, corners and seams.

2.05 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Provide wall and door protection systems of each type from a single source and manufacturer.

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.
1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.
- 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.
- B. Position corner guard 4 inches (102 mm) above finished floor to ceiling

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch (6 mm).
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch (6 mm).

3.04 CLEANING

- A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.
- B. Section 06 1000 - Rough Carpentry.
- C. Section 10 213.19 - Plastic Toilet Compartments.

1.02 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Public-use washroom accessories.
 - 2. Childcare accessories.
 - 3. Underlavatory guards.
 - 4. Custodial accessories.

1.03 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Include electrical characteristics.
- B. Samples: Full size, for each exposed product and for each finish specified.
 - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.05 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from a single source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.08 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 OWNER-FURNISHED MATERIALS

- A. Owner-Furnished Materials: The Owner will furnish the following items to be installed by the General Contractor:
 - 1. Toilet Tissue Dispensers.
 - 2. Paper Towel Dispensers.
 - 3. Soap Dispensers.

2.02 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.03 MANUFACTURER

- A. Basis-of-Design Products: Subject to compliance with requirements, provide the listed Basis-of-Design Products.
 - 1. Bobrick Washroom Equipment, Inc. (Basis-of-Design Product Manufacturer)
 - a. Or comparable products by the following:
 - 1) Bradley Corporation (wash room accessories)
 - 2. Koala (Childcare Accessories Only)
 - 3. Plumberex (Underlavatory Guards Only)
 - a. Or comparable products by one of the following:
 - 1) American Specialties, Inc.
 - 2) Bradley Corporation.
 - 4. Alternate products submitted for consideration (from one of the manufacturers listed above) must show an itemized comparison with each product named below.

2.04 PUBLIC-USE WASHROOM ACCESSORIES

- A. Toilet Tissue Dispenser (Standard Roll): **TA01**
 - 1. OFCI
- B. Paper Towel Dispenser: **TA10**
 - 1. OFCI
- C. Waste Receptacle, Surface Mounted, Large: **TA12**
 - 1. Basis-of-Design Product: Bobrick B-279
 - 2. Mounting: Open top, surface.
 - 3. Mounting Depth: 0 inches.
 - 4. Minimum Capacity: 6.4 gallon.
 - 5. Material and Finish: Stainless steel, No. 4 satin finish.
 - 6. Waste Receptacle Profile: Square-front.
 - 7. Trash Liner Holder: Removable holding device designed to facilitate installation and removal of disposable trash liners and to retain liner inside waste receptacle. Device shall have a molded plastic sleeve with a stainless steel U-shaped support strap.
 - 8. Locking: Two keyholes over studs on bottom and two tamper resistant screws at top.
- D. Soap Dispenser: **TA18**

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1. OFCI
- E. Grab Bar (short): **TA23**
1. Basis-of-Design Product: Bobrick B-6806 x 18
 2. Mounting: Flanges with concealed fasteners.
 3. Material and Finish:
 - a. Material: Stainless steel, 0.05 inch thick.
 - b. Finish: Smooth, No. 4 satin finish on ends and slip-resistant texture in grip area.
 - c. Outside Diameter: 1-1/2 inches.
 - d. Configuration and Length: Straight, 18 inches long.
- F. Grab Bar (medium): **TA24**
1. Basis-of-Design Product: Bobrick B-6806 x 36
 2. Mounting: Flanges with concealed fasteners.
 3. Material and Finish:
 - a. Material: Stainless steel, 0.05 inch thick.
 - b. Finish: Smooth, No. 4 satin finish on ends and slip-resistant texture in grip area.
 - c. Outside Diameter: 1-1/2 inches.
 - d. Configuration and Length: Straight, 36 inches long.
- G. Grab Bar (long): **TA25**
1. Basis-of-Design Product: Bobrick B-6806 x 42
 2. Mounting: Flanges with concealed fasteners.
 3. Material and Finish:
 - a. Material: Stainless steel, 0.05 inch thick.
 - b. Finish: Smooth, No. 4 satin finish on ends and slip-resistant texture in grip area.
 - c. Outside Diameter: 1-1/2 inches.
 - d. Configuration and Length: Straight, 42 inches long.
- H. Mirror, Framed, without Shelf: **TA31**
1. Basis-of-Design Product: Bobrick B-165-2436
 2. Frame: Stainless steel channel.
 3. Corners: Mitered, welded, and ground smooth.
 4. Hangers: Produce rigid, tamper and theft-resistant installation, using one-piece, galvanized steel, wall hanger device with spring action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 5. Size: 24 inches wide x 36 inches high.
- I. Sanitary Napkin Disposal Unit, Surface-mount: **TA36**
1. Basis-of-Design Product: Bobrick B-35139
 2. Mounting: Surface mounted.
 3. Door or Cover: Self-closing disposal opening cover and hinged face panel with tumbler lockset.
 4. Receptacle: Removable.
 5. Material and Finish: Stainless steel, No. 4 satin finish.

2.05 CHILDCARE ACCESSORIES

- A. Diaper-Changing Station: **TA85**
1. Basis-of-Design Product: Koala KB310-SSWM
 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support a minimum of 250-lb static load when opened.

- b. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
- c. Operation: By pneumatic shock-absorbing mechanism.
- d. Material and Finish: Stainless steel, No. 4 satin finish.
- e. Liner Dispenser: Built in.

2.06 UNDERLAVATORY GUARDS

- A. Underlavatory Guard: **TA58**
 - 1. Basis-of-Design Product: Plumberex Soft Guard Plus
 - 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 - 3. Material and Finish: Antimicrobial, molded plastic, white.

2.07 CUSTODIAL ACCESSORIES

- A. Mop and Broom Holder: **TA95**
 - 1. Basis-of-Design Product: Bobrick B-224 x 36
 - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
 - 3. Length: 36 inches.
 - 4. Hooks: Three.
 - 5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
 - 6. Material and Finish: Stainless steel, No. 4 satin finish.
 - a. Shelf: Not less than nominal 0.05 inch thick stainless steel.
 - b. Rod: Approximately 1/4-inch-diameter stainless steel.

2.08 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.09 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 10 keys to Owner's representative.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

**SECTION 104400
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 099123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- B. FM (AG) - FM Approval Guide; Current Edition.
- C. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 013000 - 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.

1.05 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: www.activarcp.com/#sle.
 - 2. Ansul, a Tyco Business; ____: www.ansul.com/#sle.
 - 3. Nystrom, Inc; ____: www.nystrom.com/#sle.
 - 4. Pyro-Chem, a Tyco Business; ____: www.pyrochem.com/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Activar Construction Products Group, Inc. - JL Industries; Ambassador Series: www.activarcp.com/#sle.
 - 2. Nystrom, Inc; ____: www.nystrom.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 1. Stored Pressure Operated: Deep Drawn.
 2. Class: A:B:C type.
 3. Size: 2.5 pound (1.13 kg).
 4. Temperature range: Minus 40 degrees F (Minus 40 degrees C) to ___ degrees F (___ degrees C).

2.03 FIRE EXTINGUISHER CABINETS

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Cabinet Construction: Non-fire rated.
 1. Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.
- C. Fire Rated Cabinet Construction: One-hour fire rated.
- D. Cabinet Configuration: Surface mounted type.
 1. Size to accommodate accessories.
- E. Door: 0.036 inch (0.9 mm) metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.
- F. Door Glazing: Float glass, clear, 1/8 inch (3 mm) thick, and set in resilient channel glazing gasket.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Fabrication: Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
- J. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Lettering: "FIRE EXTINGUISHER" decal, or vinyl self-adhering, prespaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.

3.03 MAINTENANCE

- A. Provide a separate maintenance contract for specified maintenance service.

END OF SECTION

**SECTION 105113
METAL LOCKERS**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Heavy Duty Knocked Down Fully Framed Turnout Open Front Lockers.

1.02 REFERENCES

- A. ADAAG – Americans with Disabilities Act, Accessibility Guidelines.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Show the following:
 - 1. Dimensioned drawings including plans, elevations, and sections to show locker locations and interfaces with adjacent substrates.
 - 2. Details of assembly, erection, anchorage and clearance requirements.
- C. Selection Samples: For each finish product specified, supply paint on paper chips in the chosen color(s), representing manufacturer's color and finish.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect locker finish and adjacent surfaces from damage.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Penco Products, Inc., which is located at: 1820 Stonehenge Drive, Greenville, NC 27858; Tel: 800-562-1000; Fax: 800-248-1555; Email: general@pencoproducts.com; Web: www.pencoproducts.com
- B. Lockers shall be GREENGUARD Gold Certified by UL Environment through the GREENGUARD Certification Program.
- C. Substitutions: Reference Section 01 6000 – Product Requirements.

2.02 MATERIALS

- A. Steel: Prime grade mild cold-rolled sheet steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A1008.
- B. Steel: Sheet steel components shall be fabricated using zinc-coated steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A653.
- C. Flattened Expanded Metal Divisions that meets or exceeds ASTM A1008/A1008M, captured on all sides by the tubular shaped frame assembly
- D. Self-Tapping Screws and Rivets.
- E. Provide only metal lockers that conform to Made in US regulations.

2.03 HEAVY DUTY OPEN FRONT PERSONAL EQUIPMENT LOCKERS

- A. Heavy Duty Lockers: All locker body components made of cold rolled steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.
- B. Locker Body Construction:
 - 1. Bottoms, Tops, and Shelves: 16-gauge steel.
 - 2. Sides
 - a. 16-gauge solid sides

- b. Flattened expanded metal
- c. 16-gauge diamond perforation on 72" high only
3. Backs: Solid 18-gauge steel. One-piece.
4. Tops and bottoms with four sides formed at 90 degrees welded to the fully- framed channel with cast corner pieces.
5. Channel Base: 4-inch or 6-inch high. 14-gauge sheet forming a "C" channel attached to locker bottom.
6. Shelves with four sides formed to 90 degrees, front edge having a second bend.
7. Locker Body Construction: Tubular frame construction with cast steel interlocks provide a true fully framed locker body construction
8. Hole Spacing in Locker Body Construction: Not exceeding 1.5-inches.
9. Optional factory assembly of lockers (welded version only).

2.04 INTERIOR EQUIPMENT

- A. Heavy Duty Fully Framed Turnout Lockers Without Doors:

2.05 ACCESSORIES

- A. Number Plates: Provide each locker with a polished aluminum number plate, 2-1/4 inches (57 mm) wide by 1 inch (25.4 mm) high, with black numerals not less than 3/8 inch (9.52 mm) high; attach to face of shelf with two aluminum rivets.
- B. Continuous sloped hoods: 16-gauge steel, slope rise equal to 1/3 of the locker depth (18.5 degrees), plus a 1 inch (25.4 mm) vertical rise at front.
 1. Supplied in 72-inch 72.01 inch (1829 mm) lengths only.
 2. Slip joints without visible fasteners at splice locations.
 3. Provide necessary end closures.
 4. Finish to match lockers.
- C. Finished End Panels: Minimum 16-gauge steel formed to match locker depth and height, 1-inch 0.98 inch (25 mm) edge dimension; finish to match lockers. Install with concealed fasteners.
- D. Front Fillers: 20-gauge steel formed in an angle shape, with 20-gauge slip joint angles formed in an angle shape with double bend on one leg forming a pocket to provide adjustable mating with angle filler.
 1. Attachment by means of concealed fasteners.
 2. Finish to match lockers.
- E. Recess Trim: 18-gauge steel, 3-inch 2.95 inch (75 mm) face dimension.
 1. Vertical and/or horizontal as required.
 2. Standard lengths as long as practical.
 3. 3. Attach to lockers with concealed clips.
 4. Provide necessary finish caps and splices.
 5. Finish to match lockers.
- F. Benches: Laminated selected hardwood, 1-1/4 inch (32 mm) full finished thickness, corners rounded and sanded, surfaces finished with two coats of clear lacquer.
 1. Depth: 9-1/2 inches (241 mm) deep.
 2. Depth: 12-inches 12.01 inch (305 mm) deep.
 3. Depth: 24-inches 24.02 inch (610 mm) deep.
 4. Lengths: As shown.
- G. Heavy-Duty Bench Pedestals: Steel tubing with 11-gauge steel flanges welded to each end, 16-1/4 inches (413 mm) high, finish to match lockers.

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- H. Stainless Steel Free-Standing Bench Pedestals: 2-inch 1.97 inch (50 mm) diameter brushed 16-gauge stainless steel formed into a trapezoid, 14 inch (355.6 mm) wide bottom with two 5/16 inch (7.94 mm) diameter holes, top flange with four 5/16 inch (7.94 mm) diameter holes for fastening to bench
- I. Interior Equipment
1. Optional Acrylic Mirror: Self-Adhesive, 6-inch 5.98 inch (152 mm) x 8 inch (203.2 mm).
 2. Optional Full Width Shelves. 16-gauge, flanged on four sides and attached securely to mounting side rails.
 3. Optional Center Partition: 16-gauge with flanged front. Attaches securely to shelf and locker bottom or additional lower shelf. (Not for use with footlocker or seat) Mounting holes for half shelves provided on nominal 6 inch (152.4 mm) centers.
 4. Optional Half Shelf: 16-gauge, used with full height center partition only. Flanged on three sides.
 5. Optional "L" Shaped Half Shelves: 16-gauge, flanged on three sides and attached securely on one side with a side rail, and flanged partition mounted to shelf or half shelf above.
 6. Optional Security box: 16-gauge lockable door with a 16-gauge side panel. The door is attached to the welded frame of the security using a two-point hinge. The door is locked through a single point latch with a padlock or built in lock. A door pull shall be provided for use with padlocks. Security box door frame to be not less than 16 gauge formed to a channel shape. Vertical members to have an additional flange to provide a continuous door strike.
 - a. 9-inch wide
 - b. 12-inch wide
 - c. 15-inch wide
 - d. 18-inch wide
 - e. 21-inch wide
 - f. 24-inch wide
 7. Optional cell phone/key tray: 8-inch 7.99 inch (203 mm) x 2-inch (2.01 inch (51 mm)) x 2-inch (51 mm) mounted to flanged partition side of the half shelf.
 8. Optional metal seat only: 14-gauge, mounted using mounting rails to vertical corner posts allowing adjustability.
 9. Optional hardwood seat only: 1-1/4" thick full depth mounted using mounting rails to vertical corner posts allowing adjustability.
 10. Optional footlocker: Recessed from locker frame to clear full length locker door. Front foot locker panel includes single point latch with padlock strike plate and vertical slots. 14-gauge lid of footlocker has a continuous hinge and Also serves as a seat. Opening and closing of the lid is quieted by rubber bumpers mounted to the contact points. The seat lid is strengthened with reinforcement channels welded to bottom. Lid/seat is supported by two mounting side rails attached to the vertical posts.
 11. Optional sheet steel document sleeve. 16-gauge measuring 12-inches wide (horizontal storage) or 9-1/2 inches (241 mm) wide (vertical storage) mounted to flanged partition side of the half shelf.
 12. Optional Drawers. 12-inch-high or 6-inch high. Drawer body shall be constructed of 16-gauge sheet steel, mounted using an integral "C" channel and mounted to the side rails that are mounted to the corner posts.
 13. Optional Parachute/body armor rack. Formed from 3/4 inch diameter, heavy wall steel tube. Reinforced by 14-gauge gussets. Mounted to rear of locker using two mounting rails between corner posts. 180 pound capacity.
 14. Optional Inner Compartment Door, attached to "L" shaped half shelf
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15. Optional Coat Rods using coat rod hooks mounted to shelf.

2.06 FABRICATION

- A. Fabricate lockers with fully framed construction, 8 male/female tubular insertion points to provide the fully framed locker body, square, rigid, without warp, with metal faces flat and free of distortion.
- B. Fabricate lockers on the unit principle, each locker with individual door and frame, individual top, bottom, back, and shelves. Verify dimensions and arrangement before fabrication.
- C. Finish: Hybrid Polyester powder coat paint finish electrostatically applied and properly cured to manufacturer's specifications for optimum performance. Finishes containing volatile organic compounds and subject to out-gassing are not acceptable. Locker exterior and interior shall be painted the same color.
 - 1. Powder Coat - Dry Thickness: 1 to 1.2 mils (0.025 to [0] inch.
 - 2. Powder Coat Plus - Dry Thickness: 2 to 2.2 mils (0.05 to [0] inch.
 - 3. Color: As selected from manufacturer's standard colors.
 - 4. Special Finish
 - a. Custom color
 - b. Anti-Graffiti
 - c. Anti-Microbial

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates and bases have been properly prepared.
- B. If substrate and bases are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install metal lockers and accessories at locations shown in accordance with manufacturer's instructions.
- B. Install lockers plumb, level, and square. Work is not to progress until site meets necessary conditions.
- C. Anchor lockers to floor and/or wall as recommended by the manufacturer.
- D. Bolt adjoining locker units together to provide rigid installation.
- E. Install sloping tops and metal fillers using concealed fasteners. Provide flush hairline joints against adjacent surfaces.
- F. Install benches by fastening bench tops to pedestals and securely anchoring to the floor using appropriate anchors for the floor material.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.
- B. Adjust built-in locks to prevent binding of dial or key and ensure smooth operation prior to substantial completion.
- C. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.

3.04 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

**SECTION 107316.13
METAL CANOPIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Attached metal canopies.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete footings.
- B. Section 076100 - Sheet Metal Roofing: Canopy roof.
- C. Section 077123 - Manufactured Gutters and Downspouts.
- D. Section 099113 - Exterior Painting: Finish coating.
- E. Section 099600 - High-Performance Coatings: Finish coating.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2022, with Errata (2025).
- 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 A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- H. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2025.
- I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- J. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process; 2022a.
- K. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- L. ASTM E2950 - Standard Specification for Metal Canopy Systems; 2014 (Reapproved 2020).
- M. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.
- N. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.
- O. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

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- P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
 - Q. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit product data sheets, including material descriptions and finishes, and preparation instructions and recommendations.
- C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing profiles, sections of components, finishes, and fastening details.
- D. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by professional engineer.
- E. Designer's Qualification Statement.
- F. Manufacturer's Qualification Statement.
- G. Erector's Qualification Statement.
- H. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Perform steel work in accordance with AISC 303.
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
- D. Erector Qualifications: Company specializing in performing the work of this section.
 - 1. Not less than 5 years of documented experience and approved by canopy manufacturer.
- E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site ready for erection.
- B. Package using methods that prevent damage during shipping and storage on site.
- C. Store materials under cover and elevated above grade.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Metal Canopies: Correct defective work within a two year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's ten year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Canopies:
 - 1. Duo-Gard; _____: www.duo-gard.com.
 - 2. Kingspan Light + Air, LLC; Briteway: www.kingspanlightandair.us/#sle.
 - 3. Madison Industries; _____: www.madisonind.com.
 - 4. Tennessee Valley Metals; www.tvmetals.com
 - 5. Substitutions: See Section 016000 - Product Requirements.

2.02 METAL CANOPIES

- A. Shop Fabricated Steel Canopy
 - 1. Pre-engineered steel system complying with ASTM E2950.
- B. Configuration: Layout and dimensions, column layout, canopy clearance, fascia profile, and roof covering design as indicated on drawings.
 - 1. Column Anchorage: Column baseplates installed with anchor bolts or expansion anchors into concrete footing, slab, or pier.
 - 2. Structural Framing System: Steel.
 - 3. Covering Material: Steel.
 - 4. Drainage Concept: Water collected in decking conducted into perimeter drain beams and discharged through columns.
- C. Performance Requirements:
 - 1. Design and fabricate metal canopy system to resist wind, snow, live, and seismic loads without failure, damage, or permanent deflection in accordance with ASCE 7:
 - a. Loads: In compliance with local building codes.
 - 2. Thermal Movement: Design canopy system to accommodate thermal movement caused by ambient temperature range of 120 degrees F (49 degrees C) and surface temperature range of 180 degrees F (82 degrees C) without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects on assembly components.

2.03 COMPONENTS

- A. Structural Steel Framing:
 - 1. Columns: ASTM A500/A500M, Grade B, round or rectangular tubing, sized to suit project design load requirements.
 - 2. Base and Top Plates: ASTM A36/A36M, with pre-drilled bolt holes.
 - 3. Beams: Wide flange, ASTM A572/A572M Grade 50.
 - 4. Other Structural Steel Members: ASTM A36/A36M.
- B. Covering:
 - 1. Steel Decking: Interlocking panels.
 - a. Panel Size: 16 inches wide by 3 inches deep (406 mm wide by 76 mm deep); 20 gauge, 0.0359 inch (0.91 mm) thickness.
 - b. Material: ASTM A653/A653M, G40 galvanized according to ASTM A924/A924M.
 - c. Provide canopy manufacturer's standard clip type fasteners for attaching covering to structural beams.
- C. Fascia: Same material as structural framework, 3 inches (76.2 mm) high.
- D. Anchor Bolts: ASTM A307 or ASTM A572/A572M, formed with bent shank, assembled with template for casting into concrete.
 - 1. Minimum exposed thread of 7 inches (178 mm) above footing and 23 inch (584 mm) minimum embedment.

- 2. Provide nuts and washers as required for column leveling and plumbing.
- E. Concrete Footings: Refer to Section 033000 for additional requirements.

2.04 SHOP FABRICATION

- A. Provide a complete system ready for erection at project site.
- B. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.
- C. Weld steel members in accordance with AWS D1.1/D1.1M.
- D. Fabricate connections for bolt, nut, and washer connectors.

2.05 FINISHES

- A. Structural Steel Framing:
 - 1. Shop Primer: Rust-inhibitive red oxide.
 - 2. Finish Coating: Kynar 500
- B. Steel Decking and Roofing: Polyester baked enamel finish; color as selected from manufacturer's standard range.
- C. Fascia: Polyester baked enamel finish; color as selected from manufacturer's standard range.

2.06 ACCESSORIES

- A. Structural Bolts: ASTM F3125/F3125M, Grade A325, minimum 3/4 inch (19 mm) diameter.
- B. Grout: ASTM C1107/C1107M; non-shrinking; premixed compound consisting of non-metallic aggregate, cement, water-reducing and plasticizing agents.
- C. Fasteners, Non-Structural: ASTM F593 stainless steel or ASTM A307 carbon steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and site area for conditions that might prevent satisfactory installation.
- B. Verify that foundation, electrical utilities, and placed anchors are in correct position.
- C. Do not proceed with installation until all conditions are satisfactory.

3.02 INSTALLATION - FRAMING

- A. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation.
- B. Set column base plates with non-shrink grout to achieve full plate bearing.
- C. Fasten columns to anchor bolts.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 INSTALLATION - CANOPY COVERING

- A. Install in accordance with manufacturer's instructions.
- B. Fasten metal decking to metal support members, aligned level and plumb.
- C. Install fascia panels, trim, and flashing.
- D. Separate dissimilar metals using concealed bituminous paint.
- E. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 TOLERANCES

- A. Maximum Variation from Level: Plus/Minus 1/8 inch (3.175 mm).

3.05 CLEANING

- A. Clean surfaces of dust and debris; follow manufacturer's cleaning instructions for the finish used.

END OF SECTION

**SECTION 107500
FLAGPOLES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stainless steel Flagpoles.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete base and foundation construction.
- B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains; 2016 (Reapproved 2020).
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes; 2025.
- D. NAAMM FP 1001 - Guide Specifications for Design Loads of Metal Flagpoles; 2007.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. Product Data: Provide data on pole, accessories, and configurations.
- B. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.
- C. Designer's Qualification Statement.
- D. Operation Data: Provide operating data for the controller and timer.
- E. Maintenance Data: Provide lubrication and periodic maintenance requirement schedules and _____.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed the State in which the Project is located.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect flagpole and accessories from damage or moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flagpoles:
 - 1. Concord American Flagpole; Internal - Independence: www.concordamericanflagpole.com/#sle.
 - 2. Morgan-Francis Flagpoles & Accessories; ____: www.morgan-francis.com/#sle.
 - 3. Pole-Tech Co, Inc; ____: www.poletech.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 FLAGPOLES

- A. Flagpoles: Designed in accordance with NAAMM FP 1001
 - 1. Material: Aluminum.
 - 2. Design: Cone tapered.
 - 3. Mounting: Ground mounted type.
 - 4. Nominal Height: 30 ft (____ m); measured from nominal ground elevation.
 - 5. Halyard: Internal type, manual winch operation.
- B. Performance Requirements:
 - 1. Wind Pressure Loading on Flagpole with Flag: Resistant without permanent deformation to wind speed in accordance with NAAMM FP 1001; the factor of safety used is 2.5.

2.03 POLE MATERIALS

- A. Stainless Steel: ASTM A312/A312M TP304 grade.

2.04 ACCESSORIES

- A. Lighting Unit: Aluminum; consisting of LED lights arranged in circular unit around flagpole.
 - 1. Mounting Height: 8.5 ft (2.6 m).
 - 2. Aluminum Finish: Powder coated.
 - 3. Light Color Temperature: 3000K.
- B. Finial Ball: Stainless steel, 6 inch (150 mm) diameter.
- C. Flag: _____ design, 5 ft by 8 ft (1.5 m by 2.4 m) size, nylon fabric, brass grommets, hemmed edges.
- D. Halyard: 5/16 inch (8 mm) diameter nylon, braided, white.
- E. Connecting Sleeve For Multiple Section Poles: Same material as pole, precision fit for field assembly of pole, concealed fasteners.

2.05 OPERATORS

- A. Hand Crank: Removable _____ type.

2.06 MOUNTING COMPONENTS

- A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gauge, 0.0598 inch (1.52 mm) steel, galvanized, depth of ____ inches (____ mm) as indicated.
- B. Lightning Ground Cable: Copper No. 6 AWG, soft drawn.

2.07 FINISHING

- A. Metal Surfaces in Contact With Concrete: Asphaltic paint.
- B. Concealed Steel Surfaces: Prime painted.
- C. Exposed to View Steel Surfaces: Galvanized to ASTM A123/A123M requirements.
- D. Stainless Steel: No. 4 satin finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

- A. Install flagpole , base assembly, and fittings in accordance with manufacturer's instructions.
- B. Electrically ground flagpole installation.
- C. Locate electric control box where indicated.
- D. Coordinate installation of conduit and boxes from disconnect to control unit and control unit to motor operating device.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1 inch (25 mm).

3.05 ADJUSTING

- A. Adjust operating devices so that halyard and flag function smoothly.

END OF SECTION

**SECTION 108213
EXTERIOR GRILLES AND SCREENS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior aluminum grilles and screens attached to structure.

1.02 RELATED REQUIREMENTS

- A. Section 051200 - Structural Steel Framing: Mounting substrates.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. 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).
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- E. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Submit detailed shop drawings, indicating component profiles, sections, finishes, fastening details, special details, and manufacturer's technical and descriptive data.
 - 1. Include field dimensions of openings and elevations on shop drawings.
 - 2. Indicate distinction between factory-assembled and field-assembled work on shop drawings.
- C. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by professional engineer.
- D. Designer's Qualification Statement.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform structural design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened packaging, with labels clearly identifying manufacturer and material.
- B. Store materials indoors, protected from moisture, humidity, and extreme temperature fluctuations.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a one year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's ten year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Exterior Metal Grilles and Screens:
 - 1. Architectural Grilles & Sunshades, Inc; _____: www.agsshade.com/#sle.
 - 2. Construction Specialties, Inc; Geometric Grilles: www.c-sgroup.com/#sle.
 - 3. Industrial Louvers, Inc; _____: www.industriallouvers.com/#sle.
 - 4. Metalwerks; Screenwalls: www.metalwerksusa.com/#sle.
 - 5. Ruskin Company; _____: www.ruskin.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.

2.02 GRILLES

END OF SECTION

**SECTION 115214
PROJECTION SCREENS**

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Front projection screens, suspended, motorized.
 - 2. Note that final screen selection shall be subject to prior approval by Architect prior to ordering.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 04 2000 - "Unit Masonry".
- C. Division 5 - Metal Fabrications: Suspension systems for projection screens.
- D. Division 6 Section "Rough Carpentry" for wood backing for recessed screen installation.
- E. Division 9 Sections "Suspended Acoustical Ceilings" and "Gypsum Board Assemblies" for supports, trim and ceiling for screen installation.
- F. Division 26 Sections for electrical wiring, connections, and installation of remote-control switches for electrically operated projection screens.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code.
- B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- C. GREENGUARD Environmental Institute Gold.
- D. US Green Building Council.

1.04 DEFINITIONS

- A. Gain: Ratio of light reflected from or refracted by screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per FS GG-S-00172D(1).
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface, to the most central position on perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.
- C. Throw Ratio: Distance from lens to screen, divided by width of image projected.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Wiring diagram for electrically operated units.
- D. Shop Drawings: Show layout and types of projection screens and projectors. Include the following:
 - 1. Location of screen centerline relative to ends of screen case.
 - 2. Location of wiring connections.
 - 3. Location of seams in viewing surfaces.

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- 4. Connections to suspension systems.
 - 5. Anchorage details.
 - 6. Details of juncture of exposed surfaces with adjacent finishes.
 - 7. Frame details.
 - 8. Accessories.
- E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Obtain projection screens through one source from a single manufacturer. Obtain each screen as a complete unit, including necessary mounting hardware and accessories.
- B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver projection screens or projectors until building is enclosed, and other construction within spaces where screens will be installed is substantially complete.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Protect screens from damage during delivery, handling, storage, and installation.

1.08 COORDINATION

- A. Coordinate work with installation of ceilings, walls, electrical service power characteristics, and location.

1.09 WARRANTY

- A. Provide manufacturer's standard one year warranty against defects in material and workmanship, from time of substantial completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Screens:
 - 1. Draper, Inc., Spiceland, IN; [Basis of Design]: www.draperinc.com.
 - 2. Bretford Manufacturing, Inc.
 - 3. Da-lite Screen Co., Inc.; "Tensioned Large Advantage Deluxe Electrol".
 - 4. Substitutions: Section 01 6000 – Product Requirements.

2.02 FRONT PROJECTION SCREENS, MOTORIZED, SUSPENDED

- A. Paragon V: Large electrically operated, tab tensioned, extruded aluminum case. Projection screen with motor in roller. Case fully enclosed except for slot allowing viewing surface passage. Roller: 6 inches diameter steel tube. Viewing surface securely attached to roller at top and at bottom to weighted dowel. Mount with threaded rods secured to structure per manufacturer's installation instructions.
 - 1. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
 - 2. Ceiling Mounted Bracket Kit.
 - 3. Motor Screen Controls, UL Certified.

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- a. Multiple station control rated 115V AC, 60 Hz with 3-position rocker switches with cover plates to stop or reverse screen at any point. Automatic override allows only one signal to reach the motor when operated simultaneously.
 - 1) Consult with Architect/Owner for location of control stations.
 - b. Key Operated power supply switch to control power to control system.
 - c. Locking switch cover plate for limited access to three position switch.
 4. Projection Viewing Surface.
 - a. Matt White XT1000V - On Axis gain of 1.0. 180 degree viewing cone. GREENGUARD Gold certified. Provide with black backing.
 5. Tab-Tensioning System.
 - a. Viewing surface with integrated tabs and cable on each side of fabric to provide tension and ensure flat viewing surface. Viewing surface and tabs CNC cut as a single piece. Tabs RF welded to the back of viewing surface to prevent tab separation. Tab adhesives are not acceptable. Warranted for 5 years against tab separation. Viewing surface inserted into aluminum bottom dowel.
 6. Viewing Area H x W.
 - a. HDTV Format (16:9). Black masking borders standard.
 - 1) 133 inch diagonal, 116 inches x 65 inches (9'8" feet x 5'5" feet)
 7. Provide a 12 inch black screen drop with top border matching the viewing surface.
 8. Projection Screen Case finish shall be flat black.

2.03 PROJECTOR - NOT IN CONTRACT

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify rough-in openings are properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install projection screens at locations indicated to comply with manufacturer's current written instructions.
- B. Install projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges, and plumb and flat viewing surfaces when screen is lowered.
- C. Test electrically operated units to verify that screen, controls, limit switches, closure, and other operating components are in optimum functioning condition.
- D. Test manually operated units to verify that screen operating components are in optimum functioning condition.

3.04 PROTECTING AND CLEANING

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 122414
ROLLER WINDOW SHADES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Manually operated sunscreen roller shades.
- B. Electrically operated sunscreen roller shades.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 06 1000 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.
- C. Section 09 2116 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.
- D. Section 09 5100 - Suspended Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.
- E. Division 26 - Electrical: Electric service for motor controls.

1.03 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 3000.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

-
- G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- F. Mock-Up: Provide a mock-up (for both manual and electrical shades) of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up in window designated by Architect.
 - 2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.08 WARRANTY

- A. Shade Fabric: Manufacturer's 10-year warranty.
- B. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five-year warranty.
- C. Roller Shade Hardware, and Chain: 5 years warranty against defects in materials and workmanship.
- D. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Caco, Inc.
- B. Draper, Inc.; "Access FlexShades" [Basis of Design]: www.draperinc.com.
- C. MechoShade Systems, Inc. www.mechoshade.com.
- D. Substitutions: Section 01 6000 - Product Requirements.

2.02 SHADE CLOTH

- A. Light-Filtering Fabrics:
 - 1. SheerWeave Series SW2900 Series by Phifer: VOC Emissions: GREENGUARD and GREENGUARD Gold - certified as a low-emitting fabric. Composition: 38% Fiberglass, 62% Vinyl on Fiberglass. Fire rating: NFPA 101 (Class A Rating). Bacteria and Fungal Resistance: ASTM E 2180; ASTM G 21AATCC30 Part 3; ASTM D 3273; GREENGUARD Mold and Bacteria Standard ASTM 6329. Include Microban antimicrobial additives. Mesh Weight: 14.1 oz/sq yd. Openness Factor - Approx. 3 percent. UV Blockage - Approx. 95 Percent. Fabric thickness: 0.022 inches.
- B. Color and Pattern: As selected by Architect from manufacturer's standard range.

2.03 MANUAL WINDOW SHADES

- A. Type: Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation. Includes aluminum housing with installation to be coordinated with ceiling system installation. Provide brackets, fasteners, and other components necessary for complete installation.
- B. Provide shade hardware constructed as required to support 150 percent of the full weight of each shade.
- C. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - 1. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon.
 - 2. Bead chain loop: Stainless steel bead chain hanging at side of window.
- D. Roller: Fabricated from extruded aluminum or steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade size. Provide with roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin to allow easy installation and removal of roller. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
- E. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
- F. Endcap covers to match fascia/headbox finish.
- G. Shade slat: Slat encased in heat seamed hem.
- H. Headbox Ceiling/Wall Style: Aluminum fabrication with removable closure, endcaps, and back and top cover piece:
 - 1. Finish: Powder coat color as selected by Architect.
- I. Location: In Administrative Spaces. See Drawings.

2.04 MOTORIZED WINDOW SHADES

- A. Type: Motorized vertical roll-up, fabric, window shade with motors, controls, mounting brackets, and other components necessary for complete installation; Motorized Access FlexShade as manufactured by Draper, Inc., is Basis of Design. Provide Dual Roller Access FlexShade where noted on drawings.
 - 1. Endcaps and headbox.
- B. Shade Motor and Control System

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1. Standard Motor: 110VAC, single phase, 60 HZ, instantly reversible, lifetime lubricated, and equipped with internal thermal overload protector, electric brake, and pre-set accessible limit switches. Tubular motor concealed inside each shade roller tube.
 2. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly.
 - a. Multiple Shade Control:
 - 1) IntelliFlex Shade Control System for each bank of windows.
 - 2) Provide AV gateway interface.
 - C. Roller: Fabricated from extruded aluminum or steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade size. Provide with roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin to allow easy installation and removal of roller. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
 - D. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - E. Endcap covers to match fascia/headbox finish.
 - F. Shade slat: Slat encased in heat seamed hem.
 - G. Headbox Ceiling/Wall Style: Aluminum fabrication with removable closure, endcaps, and back and top cover piece:
 1. Finish: As selected by the Architect from manufacturer's standard colors.
 - H. Location: See Drawings.

2.05 ACCESSORIES

- A. Roller Shade Pocket for recessed mounting in acoustical tile, or drywall ceilings where indicated on the Drawings.
 1. Provide either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
 - a. Provide "Vented Pocket" such that there will be a minimum of four 1 inch (25.4 mm) diameter holes per foot allowing the solar gain to flow above the ceiling line.
- B. Fascia, where required for non-recessed mounting:
 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 5. Notching of Fascia for manual chain shall not be acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.04 TESTING AND DEMONSTRATION

- A. Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.
- B. Test motorized window shades to verify that controls, limit switches, interface to other building systems, and other operating components are functional. Correct deficiencies.
- C. Demonstrate operation of shades to Owner's designated representatives.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 123219
LAMINATE CASEWORK**

PART 1 - GENERAL

1.01 SUMMARY

- A. The General Contractor, at its option, may furnish and install Custom Architectural Woodwork (Millwork) in lieu of the Casework specified in this Section. See Section 06 4000 - Custom Architectural Woodwork for requirements.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Special Conditions and Division 1 - Specification sections, apply to work of this section.
- B. Section 06 1000 - Rough Carpentry.

1.03 WORK INCLUDED

- A. The extent of manufactured casework systems as shown on drawings, schedules, and specified herein. Where specific materials, finishes, construction details, and hardware are specified herein, the casework contractor shall be held in strict accordance. All items shall be as provided, and publicly cataloged, by the manufacturers to assure physical and dimensional integrity of the system and ready access to additional systems components for a minimum of ten (10) years after completion of this contract. Product from companies not meeting this requirement will not be accepted. It is the intent of the owner and architect and construction manager to have this specification section furnished by one contractor.
- B. Furnish and install all fixed, modular, and mobile laminate clad casework, tops and accessories and components, fillers and related items shown on drawings and herein specified. All built-in and modular plastic laminate counter tops and splashes are specified herein and detailed on architectural.
- C. Furnish and install all locks for cabinet doors and drawers as indicated on elevations of the architectural drawings.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain entrance mats, grates, and frames from a single manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing specified mats and grates with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in installing mats and grates with minimum three years documented experience and approved by carpet tile manufacturer.
- D. Flammability in accordance with ASTM E648, Class I, Critical Radiant Flux minimum 0.45 watts/ SM.
- E. Slip Resistance: Per ASTM D 2047-96, Coefficient of Friction 0.60 when wet, or better.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 6 - Coordination of all in-wall blocking.
- B. Sinks and service fixtures, service and waste lines and all connections, vents, electrical service fixtures, hoods and ducting within or adjacent to casework, or otherwise required in all areas: Furnished and installed under Mechanical and Electrical Divisions 21 through 26.
- C. Base molding: Furnished and installed under Finishes Division 9, to be consistent with base molding in room, unless base is not specified, in which case laminate base shall be applied.
- D. Appliances, unless specifically noted on plans as included in this section.

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- E. Furnishing, installing and connecting of service supply lines and conduits within equipment and reagent racks, connecting of exposed service lines, connecting of services in tunnels or service turrets through, under, or along backs of working surfaces as required for utility service fixtures.
 - F. Installing all utility service outlet accessory fittings and fixtures furnished by casework contractor, pulling of wire and connecting of electrical fixtures in service lines, provision of ground fault protection for circuits requiring such.
 - G. Receiving, installing and connecting all separate sinks, cup sinks or drains, draining troughs, overflows and sink outlets, as furnished by the casework contractor for the Work Room and Storage Room areas.
 - H. Furnishing, installing and connecting all traps, tailpieces, backflow prevention devices and special plumbing fittings and piping of unusual nature to meet local codes even though not specifically called for in specifications or shown on drawings.
 - I. Furnishing and installing of all framing, bucks, metal grounds or reinforcements in walls, floors, ceilings to adequately support and anchor casework and related equipment.
 - J. Furnishing fluorescent tubes, light bulbs and any miscellaneous materials generally classified as maintenance or supply items.
 - K. Furnishing and installation of all rigid or flexible conduit, wire, pulling of wire, fittings, special electrical equipment, data, and accessories including boxes, receptacles, and flush plates required at reception desk.
 - L. Coordination with millwork items as specified in Section 06 4000 - "Architectural Woodwork".

1.06 SYSTEM DESCRIPTION

- A. All manufactured casework shall be pre-engineered, and cataloged in a nationally published catalog. Manufacturers submitting for approval must provide printed catalog information documenting this performance feature; no exceptions will be allowed.

1.07 QUALITY ASSURANCE

- A. All manufactured casework systems, countertops and related items herein specified shall be furnished by one contractor to insure single source responsibility, and integration with other building trades
- B. All manufacturers herein listed, shall show evidence of a minimum of five (5) years experience in providing manufactured casework systems for similar types of projects.
- C. Manufacturer shall produce evidence of adequate facilities and personnel required to perform on this project. Financial stability of manufacturer shall be evidenced by readily providing a material performance bond if required.
- D. Manufactured casework systems must conform to design, quality of materials, workmanship and function as shown on drawings and specified herein. In the absence of a printed specification, minimum quality standards shall be in accordance with AWS Section 10 & Section 11, 1st Edition, Oct. 2009, no exceptions will be permitted; additional requirements shall be as specified herein.
- E. Provide independent laboratory testing documenting that the support rail and interfacing components when tested in strict accordance with the requirements of seismic construction codes, all components met or exceeded the requirements as set forth by the codes. All casework bidders must provide a copy of test to architect ten days prior to bid date.
- F. All casework bidders must provide the following test results as tested by an independent testing firm:
 - 1. Racking Test (must exceed 975 lbs.)
 - 2. Front Joint Load Test (must exceed 635lbs.)

3. Uniform Load Shelf Test (must exceed 1140 lbs.)
 4. Isolated Shelf Clip Load Test (must exceed 640 lbs.)
 5. Static Load Test (must exceed 1800 lbs with no cabinet failure)
 6. Draw Side Joint Test (must exceed 425 lbs.)
 7. Draw Front Joint Test (must exceed 925lbs.)
 8. Draw Static Load Test (must exceed 900 lbs.)
- G. The architect and owner reserves the right to randomly select one 36" wide base cabinet and one 36" wide wall cabinet and one 36" wide tall cabinet from each manufacturer during installation and cut apart to determine if the product installed meets the written specification. The casework manufacturer shall include the price to replace these units in his bid. If the product fails to meet the specification then the casework supplier shall be responsible to make any and all necessary corrections.

1.08 SUBMITTALS

- A. Product Data:
1. In addition to the general conditions as relates to prior approvals, submittals of manufacturer's data, installation instructions, and samples are required upon architect's request.
- B. Samples:
1. Submit samples of specified decorative laminate colors, patterns, and textures for exposed and semi-exposed materials for architect's selection. See drawings.
 2. Submit samples of hardware.
 3. Architect may request representative full-size samples for evaluation prior to approval. Samples may be impounded by architect/owner until completion of project to ensure compliance with specifications.
 4. Submit copy of Seismic testing report.
- C. Production Drawings:
1. Submit production drawings for all casework systems and countertops and required equipment showing plans, elevations, ends, cross-sections, service run spaces and location of services.
 2. Include layout of units with relation to surrounding walls, doors, windows, and other building components. Include finish and hardware schedule.
 3. Coordinate production drawings with other work involved.

1.09 PRODUCT HANDLING

- A. Deliver casework and countertops only after wet operations in building are completed.
- B. Store completed casework and countertops in a ventilated place, protected from the weather, with relative humidity range of 20% to 50%.
- C. Protect finished surfaces from soiling and damage during handling and installation.
- D. General Contractor shall be responsible for protection of all casework and tops after installation is completed.

1.10 JOB CONDITIONS

- A. Humidity and Temperature Controls:
1. Before the delivery and installation of casework and equipment, building conditions shall be as follows:
 - a. The building shall be secure and weather tight, with windows and doors installed, heat and air conditioning systems functional.
 - b. Walls and openings shall be plumb, straight and square. Concrete floors shall be level within acceptable trade tolerances. Specifically the floor must be within 1/8" of

level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.

- c. Flooring required to be placed under casework and equipment must be installed.
- d. Wood or metal blocking (wall grounds) shall be installed within partitions prior to delivery of casework and furnishings to allow for immediate installation on delivery.
- e. General Contractor shall have heat and air conditioning systems providing consistent temperature and humidity conditions as required. Related humidity must be maintained at not less than 25%, nor more than 55%. Temperatures must not range lower than 65 degrees F, not to exceed 80 degrees F in areas of material installation.
- f. All overhead mechanical, electrical or plumbing rough-in work shall be complete
- g. Any "wet" operation performed by other trades must be complete prior to delivery.
- h. Ceiling grids (with or without ceiling tiles), overhead soffits, duct work and lighting shall be installed.
- i. Painting shall be complete.
- j. General Contractor shall provide a secure storage area within the building that is clean, dry well ventilated, protected from direct sunlight and broom clean.

1.11 WARRANTY

- A. The manufacturer shall guarantee all materials and workmanship of equipment provided in this contract for a period of five years from date of final acceptance. This is a warranty of replacement and repair only, whereby the manufacturer will correct defects in materials and/or workmanship without charge. Any defective materials or faulty workmanship occurring within that time shall be replaced or corrected promptly without charge upon notification by the owner or his designated representative. All bidders are to provide to the Architect a copy of the manufacturers warranty for the casework ten (10) days before the bid date.

PART 2 – PRODUCTS

2.01 PLASTIC LAMINATE CASEWORK

- A. Manufacturers: Subject to compliance with specifications, provide products by one of the following:
 - 1. Casework Systems:
 - a. TMI Systems Design Corporation.
 - b. Case Systems, Inc.
 - c. LSI Corporation of America, Inc.
 - d. Stevens Industries, Inc.
 - 2. Plastic Laminate: Provide products from manufacturers listed on Finish Legend.
- B. Substitutions:
 - 1. It is the intent of this specification to establish performance and quality criteria consistent with pre-established standards of design and function herein described. Casework systems not meeting these minimum standards will not be accepted.
 - 2. Where specific materials, finish options, construction details, modularity, hardware and test data are specified herein, the casework storage system will be held in strict compliance. Substitutions will be considered prior to bid date provided request is submitted to the architect, in writing, no later than ten (10) days prior to bid date; substitution request shall list any and all deviations from this specification. Requests later than ten (10) days prior to bid will not be considered. Acceptable substitutions will be identified in future addenda.
 - 3. All manufacturers must submit the following items to the architect ten days prior to bid date to be qualified to bid.
 - a. A Copy of required Seismic Testing Data related to rail casework.
 - b. ADA Brochure depicting ADA requirements and compliance

- c. All required independent test reports.
- d. A sample base cabinet of fixed base cabinet with required hardware.
- e. A copy of Guarantee and Limited Warranty.
- f. A detailed deviation list addressing where the requested product deviates from the specified product.

2.02 MATERIALS

- A. Core Materials:
 1. MR Moisture Resistant Medium Density Fiberboard: Average 47-pound density grade, ANSI A 208.2.
 2. Medium Density Fiberboard: Average 47-pound density grade, ANSI A 208.2.
 3. Grade AB Plywood
- B. Hardboard: 1/4 inch thick prefinished hardboard, CS-251.
- C. Decorative Laminates:
 1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-1995. for vertical surfaces.
 2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-1995 for horizontal Surfaces.
 3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-1995 for post formed tops.
 4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-1995.
 5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-1995.
 6. Thermally fused melamine laminate, NEMA Test LD 3-1995.
- D. Laminate Color Selection: See Finish Legend for color selection.
- E. Edging Materials:
 1. 1 mm PVC banding.
 2. 3mm PVC banding, machine profiled to 1/8 inch radius, where required and herein specified.
 3. Finish: To be selected.
- F. Grommets:
 1. 2-1/2" x 6" rectangle grommet - equal to Mocket #RG3-P3. See Drawings for location.

2.03 SPECIALTY ITEMS

- A. Metal Parts:
 1. Countertop support brackets, undercounter support frames, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and epoxy powder painted. Color shall be as selected by Architect from manufacturer's standard colors.
 - a. Support brackets shall be equal to Rakks EH Counter Support Bracket unless otherwise noted.
 - 1) For concealed support, provide Inside Wall-Flush Mount bracket.

2.04 CABINET HARDWARE

- A. Hinges:
- B. 170-degree adjustable "CLIP System" concealed self-closing hinges as manufactured by Julius Blum, Inc., or equivalent by Grass or Stanley.
 1. Doors 48 inch and over in height shall have 3 hinges per door.
- C. Pulls:
 1. Wire pulls equivalent to Stanley No. 4484, stainless steel, satin finish (ANSI B12012), 4-inches long, with 1-inch clearance; finish to match Section 08710 - "Finish Hardware"

finish in room(s) where occurs. Pull design shall comply with the Americans with Disability Act (ADA).

- D. Drawer Slides:
 - 1. Regular, knee space and pencil slides shall be 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers and have a positive stop both directions with self-closing feature. Paper storage units shall have 150-pound load rated epoxy coated steel slides.
 - 2. File: Full extension, Shall have 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers and have positive stop both directions with self-closing feature.
- E. Adjustable Shelf Supports:
 - 1. Injection molded transparent polycarbonate friction shall fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support shall have 2 integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support shall automatically adapt to 3/4 inch or 1 inch thick shelving and provide a non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.
- F. Locks:
 - 1. Shall be standard removable core, disc tumbler, cam style lock for drawer with strike. Furnish 2 keys.
- G. Coat Rods: Shall be 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.
- H. File Suspension System: Shall be 14-gauge steel file suspension rails, epoxy powder coated. File followers, or other split bottom hardware, will not be acceptable.

2.05 FABRICATION

- A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown.
- B. Cabinet Body Construction:
 - 1. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals.
 - 2. Minimum 6 dowels each joint for 24 inch deep cabinets and a minimum of 4 dowels each joint for 12 inch deep cabinets.
 - 3. Tops, bottoms and sides of all cabinets are 3/4 inch thick particleboard core.
 - 4. Cabinet backs: 1/2 inch thick. Wall and tall cabinets are provided with a 1-inch x 1-3/4 inch PVC mounting strip used to secure the cabinet to the wall.
 - a. Exposed back on fixed or movable cabinets: 3/4 inch particleboard with the exterior surface finished in VGS laminate as selected.
 - b. Flexible rail mounted cabinet backs: 3/4 inch thick particleboard structurally doweled into cabinet sides and top panels.
 - 5. Fixed base and tall units have an individual factory-applied base, constructed of 3/4 inch exterior grade plywood. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawing.
 - 6. Base units, except sink base units: Full sub-top. Sink base units are provided with open top, a welded steel/epoxy painted sink rail full width at top front edge concealed behind face rail/doors, a split back removable access panel.
 - 7. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.

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8. Exposed and semi exposed edges.
 - a. Edging: 1mm PVC
 9. Adjustable shelf core: 1 inch thick particleboard up to 36 inches wide, 1-inch thick particleboard with corrugated metal ribbed stiffener for shelves over 36 inches wide.
 - a. Front edge: 1mm PVC.
 10. Interior finish, units with open Interiors:
 - a. Top, bottom, sides, horizontal and vertical members, and adjustable shelving faces with VGS High Pressure decorative laminate. Match exterior finish.
 11. Interior finish, units with closed Interiors:
 - a. Top, bottom, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine laminate with matching prefinished back. Color to be selected by Architect.
 12. Exposed ends:
 - a. Faced with VGS high-pressure decorative laminate.
 13. Wall unit bottom
 - a. Faced with thermally fused melamine laminate.
 14. Wall and tall unit tops:
 - a. Top surface is faced with thermally fused melamine laminate.
 15. Balanced construction of all laminated panels is mandatory.
 16. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), not permitted.
 17. Provide specified grommets in bracket supported countertops. 1 per 5'-0" of countertop. Locations to be determined by Architect.
- C. Drawers:
1. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 1mm PVC. Full height sides.
 2. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.
 3. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with thermally fused melamine. Minimum 1/2 inch thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.
- D. Door/Drawer Fronts:
1. Core: 3/4 inch thick particleboard.
 2. Provide double doors in opening in excess of 24 inches wide.
 3. Faces:
 - a. Exterior: VGS High-pressure decorative laminate.
 - b. Interior: High-pressure cabinet liner CLS.
 4. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.
- E. Miscellaneous Shelving: Location: Classroom storage closets.
1. Core material: 3/4 inch or 1 inch particleboard, as required.
 2. Exterior & Interior: VGS High-pressure decorative laminate.
 3. Edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The casework contractor shall examine the job site and the conditions under which the work under this Section is to be performed, and notify the building Owner in writing of unsatisfactory conditions. Do not proceed with work under this Section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 EXAMINATION

- A. Verify existing conditions under provisions of Section 01 7000.
- B. Verify that openings are ready to receive work.
- C. Verify adequacy of support framing anchors.
- D. Verify that required utilities are available. In proper locations and ready for use.
- E. Beginning of installation means installer accepts existing surface conditions.

3.03 INSTALLATION

- A. Install casework, components and accessories in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit condition and substrate materials encountered.
- C. Set casework items plumb and square.
- D. Install casework attachment rails on wall along entire length of wall to facilitate installation of wall cabinets.
- E. Hang wall mounted casework on attachment rails. Level and adjust wall casework using adjustment capabilities of wall unit mounting brackets.
- F. Assemble and install worksurface tops on site with use of concealed screws on bases such as base cabinets, pedestals or columns
- G. Scribe to abutting surfaces and align adjoining components. Apply matching filler pieces where caseworks abuts dissimilar construction.
- H. Repair small scratches and surface blemishes on units using manufacturer's supplied touch up materials. Replace damaged cabinets or materials if directed by Architect.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 7000.
- B. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

3.05 CLEANING

- A. Clean work under provisions of Section 01 7000.
- B. Clean casework, counters, shelves, glass, legs, hardware, fittings, and fixtures.
- C. Remove dirt with damp cloth and soap and water. Remove stubborn dirt with non-flammable chlorinated solvents or solvents such as: lacquer thinner, M.E.K., or contact adhesive solvent if area is ventilated sufficiently to prevent build-up of fumes and noticeable odors. Do not use harsh abrasive cleaners.

3.06 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01 5000.
- B. Do not permit finished casework to be exposed to continued construction activity.
- C. Protect finished casework from damage by water, heat and other causes until final acceptance.

- D. Replace casework exhibiting warpage, surface discoloration, and damage at no additional cost to owner.

END OF SECTION

**SECTION 133419
METAL BUILDING SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufacturer-engineered, shop-fabricated structural steel building frame.

1.02 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2025).
- B. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- E. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2025.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- I. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2024.
- J. MBMA (MBSM) - Metal Building Systems Manual; 2024.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, _____, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
- C. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- D. Designer's Qualification Statement.
- E. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
- F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- G. Project Record Documents: Record actual locations of concealed components and utilities.

1.04 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.

- B. Perform work in accordance with MBMA (MBSM).
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
- D. Erector Qualifications: Company specializing in performing the work of this section with minimum ____ years experience.

1.05 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty for _____.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Buildings Systems:
 - 1. Butler Manufacturing Company; ____: www.butlermfg.com/#sle.
 - 2. Nucor Building Systems; ____: www.nucorbuildingsystems.com/#sle.
 - 3. VP Buildings; ____: www.vp.com/#sle.

2.02 ASSEMBLIES

- A. Single span rigid frame.
- B. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, braced end frames, and end wall columns, and wind bracing.
- C. Secondary Framing: Purlins, Girts, Flange bracing, Sill supports, and Clips, and other items detailed.

2.03 PERFORMANCE REQUIREMENTS

- A. Installed Thermal Resistance of Roof System: R-value of ____ (RSI-value of ____).
- B. Design structural members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- C. Design structural members to withstand Class 90 wind uplift in accordance with UL 580.
- D. Exterior wall and roof system shall withstand imposed loads with maximum allowable deflection of 1/90 of span.
- E. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- F. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of ____ degrees F (____ degrees C).

2.04 MATERIALS - FRAMING

- A. Anchor Bolts: ASTM A307, Grade A, with no preference for protective coatings.
- B. 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 (13.7 MPa).
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).

2.05 MATERIALS - ROOF

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Designation SS (structural steel), Grade 33 (230), with G90/Z275 coating.

-
- B. Insulation: Semi-rigid glass fiber type, unfaced, ASTM E84 Class A, flame spread index of 25 or less where exposed, friction fit, ____ inches (____ mm) thick.
 - C. Metal Building Type, Rigid Cellular Polyisocyanurate (ISO) Thermal Insulation Board with Facers Both Sides: Complying with ASTM C1289.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - D. Sealant: Manufacturer's standard type.

2.06 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 ERECTION - FRAMING

- A. Erect framing in accordance with AISC 360.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 TOLERANCES

END OF SECTION

**SECTION 210500
COMMON WORK RESULTS FOR FIRE SUPPRESSION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Above ground piping.
- B. Buried piping.
- C. Escutcheons.
- D. Mechanical couplings.
- E. Pipe hangers and supports.
- F. Pipe sleeves.
- G. Piping specialties.
- H. Pressure gauges.
- I. Pressure relief valves.

1.02 RELATED REQUIREMENTS

- A. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2024.
- C. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.
- D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2025.
- E. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- G. ASTM A536 - Standard Specification for Ductile Iron Castings; 2024.
- H. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2024.
- I. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.
- J. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- K. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- L. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.
- M. AWWA C606 - Grooved and Shouldered Joints; 2022.
- N. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. NFPA 1963 - Standard for Fire Hose Connections; 2019.
- P. UL (DIR) - Online Certifications Directory; Current Edition.
- Q. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.
- R. UL 405 - Standard for Safety Fire Department Connection Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- C. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
 - 1. Minimum three years documented experience.
- C. Comply with UL (DIR) requirements.
- D. Valves: Bear UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.07 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Sprinkler-based System:
 - 1. Comply with NFPA 13.
 - 2. See Section 211300.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- C. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 BURIED PIPING

- A. Ductile Iron Pipe: AWWA C151/A21.51.
 - 1. Fittings: AWWA C110/A21.10, standard thickness.
 - 2. Joints: AWWA C111/A21.11, styrene-butadiene rubber (SBR) or vulcanized SBR gasket.
 - 3. Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.

2.03 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53 Schedule 40, black.
 - 1. Malleable Iron Fittings: ASME B16.3, threaded fittings.
 - 2. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.04 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.

2. Provide sealant for watertight joint.
 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
- B. Clearances:
1. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 2. Rated Openings: Caulked tight with firestopping material complying with ASTM E814 to prevent the spread of fire, smoke, and gases.

2.05 ESCUTCHEONS

- A. Material:
1. Metals and Finish: Comply with ASME A112.18.1.
- B. Construction:
1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.06 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- F. Vertical Support: Steel riser clamp.

2.07 MECHANICAL COUPLINGS

- A. Rigid Mechanical Couplings for Grooved Joints:
1. Dimensions and Testing: Comply with AWWA C606.
 2. Minimum Working Pressure: 300 psig.
 3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
 4. Housing Coating: Factory applied orange enamel.
 5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.

2.08 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
1. Activate electric alarm.
 2. Test and drain valve.
 3. Replaceable internal components without removing valve from installed position.
- B. Backflow Preventer: Reduced-pressure principle valve assembly backflow preventer with drain and OS & Y gate valve on each end.
- C. Commercial Riser Manifold: Preassembled and tested riser manifold in accordance with NFPA 13.
- D. Test Connections:
1. Combination Inspector's Test Connection and Drain Valve:
 - a. Provide test connections approximately 6 feet above floor for each or portion of each sprinkler system equipped with an alarm device, located at most remote part of each system.

- b. Route combination test connection and drain valve to an open-site drain location, excluding janitor sinks, accepting full flow without negative consequences.
 - c. Supply discharge orifice with same size as corresponding sprinkler orifice.
 - d. Limit vertical height of exterior wall penetration to 2 feet above finished grade.
- E. Electric Alarm: Electrically operated chrome-plated gong with pressure alarm switch.
 - F. Water Flow Switch: Vane-type switch for mounting horizontally or vertically, with two contacts; rated 10 A at 125 VAC and 2.5 A at 24 VDC.
 - G. Fire Department Connections:
 - 1. Type: Exposed, projected wall mount made of corrosion-resistant metal complying with UL 405.
 - a. Inlets: Two-way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or authority having jurisdiction. Brass caps with gaskets, chains, and lugs.
 - b. Outlet: Back with pipe threads, 6 NPS.
 - c. Rated Working Pressure: 175 psi.
 - d. Finish: Brass or bronze.
 - e. Sleeve: Brass, 18-inch height.
 - f. Signage: Raised or engraved lettering 1 inch, minimum, indicating system type.

2.09 PRESSURE GAUGES

- A. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Diameter: 4-1/2 inch.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Display in psi.

2.10 PRESSURE RELIEF VALVES

- A. ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
- G. Pipe Hangers and Supports:
 - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- J. Structural Considerations:
1. Do not penetrate building structural members unless indicated.
- K. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 3. All Rated Openings: Caulk tight with firestopping material complying with ASTM E814 to prevent the spread of fire, smoke, and gases.
 4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- L. Escutcheons:
1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
- N. Die-cut threaded joints with full-cut, standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 210500

SECTION 210523
GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Two-piece ball valves with indicators.
- B. Iron butterfly valves with indicators.
- C. Check valves.
- D. Iron OS&Y gate valves.
- E. Indicator posts.
- F. Trim and drain valves.

1.02 RELATED REQUIREMENTS

- A. Section 211300 - Fire-Suppression Sprinkler Systems.

1.03 ABBREVIATIONS AND ACRONYMS

- A. EPDM: Ethylene-propylene diene monomer.
- B. NRS: Non-rising stem.
- C. OS&Y: Outside screw and yoke.
- D. PTFE: Polytetrafluoroethylene.

1.04 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; 2020.
- C. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300; 2021.
- D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2025.
- E. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2024.
- F. AWWA C606 - Grooved and Shouldered Joints; 2022.
- G. FM 1110 - Approval Standard for Indicator Posts; 1990.
- H. FM 1112 - Examination Standard for Indicating Valves (Butterfly or Ball Type); 2020.
- I. FM 1120/1130 - Approval Standard for Fire Service Water Control Valves (OS&Y and NRS Gate Valves); 1997.
- J. FM 1140 - Approval Standard for Quick Opening Valves 1/4 Inch through 2 Inch Nominal Size; 1998.
- K. FM 1210 - Approval Standard for Swing Check Valves; 2004.
- L. UL (DIR) - Online Certifications Directory; Current Edition.
- M. UL 258 - Shutoff Valves for Trim and Drain Purposes for Fire Protection Service; Current Edition, Including All Revisions.
- N. UL 262 - Gate Valves for Fire-Protection Service; Current Edition, Including All Revisions.
- O. UL 312 - Check Valves for Fire-Protection Service; Current Edition, Including All Revisions.
- P. UL 789 - Indicator Posts for Fire-Protection Service; Current Edition, Including All Revisions.
- Q. UL 1091 - Standard for Butterfly Valves for Fire-Protection Service; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.
- C. Where listed products are specified, provide products listed, certified, and labeled by UL (DIR) or testing firm acceptable to authorities having jurisdiction as suitable for purpose indicated.
- D. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect valve ends and flange faces.
 - 3. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 - 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors and maintain at higher than ambient dew point temperature.
 - b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.
- C. Use the following precautions for handling:
 - 1. Use sling to handle large valves, rig to avoid damage to exposed parts.
 - 2. Do not use operating handles or stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Source Limitations: Furnish valves of same kind by same manufacturer.
- B. Valve-End Connections:
 - 1. Flanges on Iron Valves: ASME B16.1 or ASME B16.42.
 - 2. Threaded Ends: ASME B1.20.1.
 - 3. Grooved Ends: AWWA C606.
- C. Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.
- D. Valve Sizes: Same as upstream piping unless otherwise indicated.
- E. Valve Actuator Types:
 - 1. Worm-gear actuator with handwheel for quarter-turn valves, except trim and drain valves.
 - 2. Handwheel: For other than quarter-turn trim and drain valves.
 - 3. Hand-lever: For quarter-turn trim and drain valves 2 NPS and smaller.

2.02 TWO PIECE BALL VALVES WITH INDICATORS

- A. UL 1091 and FM 1112 listed.

- B. Description:
 - 1. Minimum Pressure Rating: 175 psig.
 - 2. Body Design: Two piece.
 - 3. Body Material: Forged brass or bronze.
 - 4. Port Size: Full or standard.
 - 5. Seat: PTFE.
 - 6. Stem: Bronze or stainless steel.
 - 7. Ball: Chrome-plated brass.
 - 8. Actuator: Worm gear or traveling nut.
 - 9. End Connections: Threaded or grooved.

2.03 IRON BUTTERFLY VALVES WITH INDICATORS

- A. UL 1091 and FM 1112 listed.
- B. Minimum Pressure Rating: 175 psig.
- C. Body Material: Cast or ductile iron.
- D. Seat: EPDM.
- E. Stem: Stainless steel.
- F. Disc: Ductile iron with EPDM coating.
- G. Actuator: Worm gear or traveling nut.
- H. Supervisory Switch: Internal or external.
- I. Body Design: Grooved-end or wafer style.

2.04 SWING CHECK VALVES

- A. UL 312 and FM 1210 listed.
- B. Minimum Pressure Rating: 175 psig.
- C. Body Material: Cast or ductile iron.
- D. Clapper: Bronze, EPDM-coated ductile iron, or stainless steel.
- E. Seat: Bronze or EPDM-coated bronze.
- F. End Connections: Flanged.

2.05 IRON OS&Y GATE VALVES

- A. UL 262 and FM 1120/1130 listed.
- B. Minimum Pressure Rating: 175 psig.
- C. Body and Bonnet Material: Cast or ductile iron.
- D. Wedge: Cast or ductile iron, or bronze with elastomeric coating.
- E. Stem: Brass, bronze, or stainless steel.
- F. Packing: Non-asbestos PTFE.
- G. Supervisory Switch: External.
- H. End Connections: Flanged.

2.06 INDICATOR POSTS

- A. Underground Indicator Posts:
 - 1. UL 789 and FM 1110 listed, ground-mounted indicator post for operating buried sprinkler-system isolation valves, with fixed or telescoping barrel.
 - 2. Barrel Standpipe Material: Carbon steel or ductile iron.
 - 3. Post Head: Cast or ductile iron.
 - 4. Operation: Locking wrench.
 - 5. Finish: AWWA C550 epoxy coating.

2.07 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Description:
 - a. UL 258 or FM 1140 listed.
 - b. Pressure Rating: 175 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Forged brass or bronze.
 - e. Port Size: Full or standard.
 - f. Seat: PTFE.
 - g. Stem: Bronze or stainless steel.
 - h. Ball: Chrome-plated brass.
 - i. Actuator: Hand-lever.
 - j. End Connections: Threaded or grooved.

B. Angle Valves:

1. Description:
 - a. UL 258 or FM 1140 listed.
 - b. Pressure Rating: 175 psig.
 - c. Body Material: Brass or bronze.
 - d. Ends: Threaded.
 - e. Stem: Bronze.
 - f. Disc: Bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

1. Description:
 - a. UL 258 or FM 1140 listed.
 - b. Pressure Rating: 175 psig.
 - c. Body Material: Bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded.
 - e. Stem: Bronze.
 - f. Disc Holder and Nut: Bronze.
 - g. Disc Seat: Nitrile.
 - h. Packing: Asbestos free.
 - i. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Confirm valve interior to be free of foreign matter and corrosion.
- B. Remove packing materials.
- C. Examine guides and seats by operating valves from the fully open position to the fully closed position.
- D. Examine valve threads and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage.
 1. Check bolting for proper size, length, and material.
 2. Verify gasket for size, defects, damage, and suitable material composition for service.
- F. Replace defective valves with new valves.

3.02 INSTALLATION

- A. Install valves in accessible locations to allow for operation, inspections, tests, and maintenance.
- B. Install listed valves in accordance with their listing.

- C. Install valves in accordance with manufacturer's instructions.
- D. Support valves independently of adjacent piping.
- E. Install valves in horizontal piping with stem at or above pipe center.
- F. Position valves to allow full actuator movement.
- G. Install OS&Y valves with full clearance for rising stem. Install surrounding components so they do not interfere with nor are they impacted by full extension of rising stem.
- H. Install supervised shutoff valves in supervised-open position.
- I. Install permanent identification signs indicating portion of system controlled by each shutoff valve.
- J. Install threaded-end valves with unions upstream and downstream.
- K. Install valve tags. Label valves in accordance with NFPA standard applying to the piping system in which valves are installed.

END OF SECTION 210523

**SECTION 211300
FIRE-SUPPRESSION SPRINKLER SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. Dry-pipe sprinkler system.
- C. System design, installation, and certification.
- D. Fire department connections.

1.02 RELATED REQUIREMENTS

- A. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.

1.03 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide; Current Edition.
- B. ITS (DIR) - Directory of Listed Products; Current Edition.
- C. NFPA 1963 - Standard for Fire Hose Connections; 2019.
- D. UL (DIR) - Online Certifications Directory; Current Edition.
- E. UL 405 - Standard for Safety Fire Department Connection Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- B. Shop Drawings: Shop drawings shall be signed, sealed, and dated—at the time of signing—by a Professional Engineer to signify that the documents were prepared by the licensee or under his or her responsible charge.
 - 1. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
- C. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
 - 2. Sprinkler Wrenches: For each sprinkler type.
- E. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.05 QUALITY ASSURANCE

- A. Comply with UL (DIR) requirements.
- B. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

- E. Equipment and Components: Provide products that bear UL (DIR) label or marking.
- F. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Anvil International: www.anvilintl.com/#sle.
 - 2. Tyco Fire Protection Products: www.tyco-fire.com/#sle.
 - 3. Victaulic: www.victaulic.com/#sle.
 - 4. Viking Corporation: www.vikinggroupinc.com/#sle.

2.02 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for entire building.
- B. Occupancy: comply with NFPA 13.
- C. Water Supply: Determine volume and pressure from water flow test data.
- D. Interface system with building fire and smoke alarm system.
- E. Provide fire department connections where indicated.
- F. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.03 SPRINKLERS

- A. Suspended Ceiling Type: Concealed pendant type with matching push on cover plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Extended.
 - 3. Finish: Brass.
 - 4. Cover Plate Finish: Enamel, color white.
 - 5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- B. Exposed Area Type: Upright type.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Extended.
 - 3. Finish: Brass.
 - 4. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- C. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Extended.
 - 3. Finish: Brass.
 - 4. Escutcheon Plate Finish: Brass.
 - 5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- D. Dry Sprinklers: Concealed pendant type with matching push on cover plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Extended.
 - 3. Finish: Brass.
 - 4. Cover Plate Finish: Enamel, color white .
 - 5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- E. Guards: Finish to match sprinkler finish.
- F. Flexible Drop System: Stainless steel, multiple use, open gate type.

1. Application: Use to properly locate sprinkler heads.
2. Include all supports and bracing.
3. Provide braided type tube as required for the application.
4. Manufacturers:
 - a. FlexHead Industries, a brand of Anvil International: www.anvilintl.com/#sle.
 - b. Victaulic Company: www.victaulic.com/#sle.

2.04 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
 1. Activate electric alarm.
 2. Test and drain valve.
 3. Replaceable internal components without removing valve from installed position.
- B. Backflow Preventer: Reduced pressure principle valve assembly backflow preventer with drain and OS & Y gate valve on each end.
- C. Electric Alarm: Electrically operated chrome plated gong with pressure alarm switch.
- D. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
- E. Fire Department Connections:
 1. Type: Exposed, projected wall mount made of corrosion resistant metal complying with UL 405.
 - a. Inlets: Two way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
 - b. Outlet: Back with pipe threads, 6 NPS.
 - c. Rated Working Pressure: 175 psi.
 - d. Finish: Brass or bronze.
 - e. Sleeve: Brass, 18 inches height.
 - f. Signage: Raised or engraved lettering 1 inch minimum indicating system type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Provide approved backflow preventer assembly at sprinkler system water source connection.
- D. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- E. Locate outside alarm gong on building wall.
- F. Place pipe runs to minimize obstruction to other work.
- G. Place piping in concealed spaces above finished ceilings.
- H. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- J. Flush entire piping system of foreign matter.
- K. Install guards on sprinklers where indicated.
- L. Hydrostatically test entire system.
- M. Require test be witnessed by Fire Marshal.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION 211300

**SECTION 220519
METERS AND GAUGES FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water meters.
- B. Pressure gauges.
- C. Thermometers.
- D. Pressure-temperature test plugs.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2020).
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).
- D. AWWA C701 - Cold-Water Meters -- Turbine Type, for Customer Service; 2024.
- E. AWWA C702 - Cold-Water Meters -- Compound Type; 2024.
- F. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance; 2012, with Addendum (2018).
- G. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- H. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Utility Service Metering: Coordinate and apply Utility Service Provider requirements in terms of meter type, size, physical location, pipe size, upstream/downstream pipe lengths required, and other installation details.

1.04 SUBMITTALS

- A. Product Data: Provide red-marked product data sheets for each furnished item with associated components and accessories.

PART 2 PRODUCTS

2.01 WATER METERS

- A. Compound Water Meters:
 - 1. Application: This type of meter is used when most of the flow is low, but some high flows are anticipated. This type of meter has the capability of recording low flows and has the capacity for high flow rates.
 - 2. Remote Monitoring: Digital register with AMR encoder output interface.
 - 3. Lead-free bronze alloy case, polymer-based cap, and hermetically sealed tamper-proof register.
 - 4. Pressure and Temperature: Up to 150 psi and 100 degrees F.
 - 5. AWWA C702, with lead content below 0.25 percent when using non-lead-free materials on wetted surfaces according to NSF 61 and NSF 372.
 - 6. Accessories: Provide downstream PT test plug, sight flow indicator, and upstream strainer.
- B. Turbine Water Meters:
 - 1. Application: This type of meter has the characteristics of a compound meter but is more suitable for encountering a variety of flows.
 - 2. Remote Monitoring: Digital register with AMR encoder output interface.

3. Lead-free bronze alloy case, polymer-based cap, test port, and hermetically sealed tamper-proof register with low flow indicator.
4. Pressure and Temperature: Up to 175 psi and 120 degrees F.
5. AWWA C701 Class II, with lead content below 0.25 percent when using non-lead-free materials on wetted surfaces according to NSF 61 and NSF 372.
6. Accessories: Provide downstream PT test plug, sight flow indicator, and upstream strainer.

2.02 PRESSURE GAUGES

- A. Manufacturers:
 1. Ashcroft, Inc: www.ashcroft.com/#sle.
 2. DwyerOmega: www.dwyeromega.com/en-us/#sle.
 3. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
 4. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
- B. Bourdon Tube for Liquids and Gases:
 1. Dial Size and Cover: 4-1/2 inch diameter scale with glass window.
 2. Dial Text and Markings: Black color on white background with scaled psi units.
 3. Accuracy: ASME B40.100, adjustable commercial grade (B) with 2 percent at mid-range of span.
 4. Process Connection: Bottom, 1/4 inch NPT male except where noted.
 5. Gauge Wetted Materials: Stainless steel case and phosphor bronze socket rated to match process pressure and temperature range.
- C. Accessories:
 1. Gauge Cock: Carbon steel with tee or lever handle for maximum 150 psi.
 2. Pressure Snubber (Pulsation Damper): Brass, 1/4 inch NPT male.

2.03 THERMOMETERS

- A. Manufacturers:
 1. DwyerOmega: www.dwyeromega.com/en-us/#sle
 2. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
 3. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
- B. General:
 1. Product Compliance: ASTM E1.
 2. Lens: Clear glass, except where stated.
 3. Accuracy: One percent, when tested in accordance with ASTM E77, except where stated.
 4. Scale: Black markings depicting single scale in degrees F where expected process value falls half-span of standard temperature range.
- C. Thermometers - Dial Type:
 1. Adjustable Angle: 5 inch diameter dial with black pointer, stainless steel case, silicone damping bimetal element, hermetically sealed lens, recalibrating screw, and 2-1/2 inch NPT stem.

2.04 PRESSURE-TEMPERATURE TEST PLUGS:

- A. Manufacturers:
 1. DwyerOmega: www.dwyeromega.com/en-us/#sle
 2. Watts Water Technologies, Inc: www.watts.com/#sle.
 3. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
- B. Size: 500 psi capacity; 1/2 inch MPT lead-free brass fitting with gasket, cap, and retaining strap for 1/4 inch pressure gauge or temperature probe.
- C. Wetted Materials per Temperature Range:
 1. Up to 200 degrees F: Brass probe with neoprene core.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify Utility Service Provider piping readiness to receive meter.
- B. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports, and test plugs.

3.02 INSTALLATION

- A. Install metering products in accordance with manufacturer's instructions for intended fluid type and service.
- B. Install water meters with inlet and outlet isolation valves in compliance with AWWA M6.
- C. Install gas meters in accordance with Utility Service Provider instructions with required appurtenances.
- D. Install pressure gauges as follows:
 - 1. At Pumps: Place single gauge before strainer, suction side and discharge side.
 - 2. Include gauge cock and pressure snubber (pulsation-damper) to isolate each gauge and extend nipples for insulation clearance.
 - 3. Include siphons on high temperature systems and select type according to service rating.
 - 4. Adjust gauges to selected viewing angle, clean thoroughly, and calibrate to zero.
- E. Install thermometers as follows:
 - 1. Hot Water Heaters: Place upstream and downstream of heater. Add one on the inlet end when using steam as the water heating medium.
- F. Locate PT (pressure-temperature) test plugs adjacent to control device sockets.

END OF SECTION 220519

**SECTION 220523
GENERAL-DUTY VALVES FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ball valves.
- B. Check valves.
- C. Globe valves.
- D. Lubricated plug valves.

1.02 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Non-rising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. TFE: Tetrafluoroethylene.
- I. WOG: Water, oil, and gas.
- J. WSP: Working steam pressure.

1.03 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- B. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022, with Errata (2023).
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- D. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2025.
- E. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
- F. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2023).
- G. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
- H. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
- I. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
- J. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- K. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- L. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.04 SUBMITTALS

- A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
- C. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.

1.05 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
 - 2. Protect valve parts exposed to piped medium against rust and corrosion.
 - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 - 4. Adjust globe valves to the closed position to avoid clattering.
 - 5. Secure check valves in either the closed position or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.

1.07 EXERCISE THE FOLLOWING PRECAUTIONS FOR HANDLING:

- A. Handle large valves with sling, modified to avoid damage to exposed parts.
- B. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- B. Provide the following valves for the applications if not indicated on drawings:
 - 1. Shutoff: Ball, plug.
 - a. Plug valves shall only be used in gas piping systems.
 - 2. Throttling: Provide globe.
 - 3. Swing Check (Pump Outlet):
 - a. 2 inch and Smaller: Bronze swing check valves with bronze disc.
- C. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.
- D. Required Valve End Connections for Non-Wafer Types:
 - 1. Steel Pipe:
 - a. 2 inch and Smaller: Threaded ends.
 - 2. Copper Tube:
 - a. 2 inch and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
- E. Domestic, Hot and Cold Water Valves:
 - 1. 2 inch and Smaller:
 - a. Bronze: Provide with solder-joint or threaded ends.
 - b. Ball: Two piece, full port, bronze with stainless-steel trim.
 - c. Bronze Swing Check: Class 125, bronze disc.
 - d. Bronze Globe: Class 125, bronze disc.

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
 - 1. Handwheel: Valves other than quarter-turn types.
 - 2. Hand Lever: Quarter-turn valves 6 inch and smaller except plug valves.

3. Wrench: Plug valves with square heads.
- D. Insulated Piping Valves: With 2 inch stem extensions and the following features:
 1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 2. Memory Stops: Fully adjustable after insulation is installed.
- E. Valve-End Connections:
 1. Threaded End Valves: ASME B1.20.1.
 2. Solder Joint Connections: ASME B16.18.
- F. General ASME Compliance:
 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 2. Solder-joint Connections: ASME B16.18.
- G. Potable Water Use:
 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
 2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.
- H. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE, BALL VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Two Piece, Full Port with Stainless Steel Trim:
 1. Comply with MSS SP-110.
 2. WSP Rating: 150 psi.
 3. CWP Rating: 600 psi.
 4. Body: Forged bronze.
 5. Ends Connections: Pipe thread or solder.
 6. Seats: PTFE.
 7. Stem: Stainless steel, blowout proof.
 8. Ball: Stainless steel, vented.
 9. Operator: Provide lockable handle and stem extension.
 10. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Milwaukee Valve: www.milwaukeevalve.com/#sle.
 - c. NIBCO INC: www.nibco.com/#sle.

2.04 BRONZE, SWING CHECK VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125:
 1. Pressure and Temperature Rating: MSS SP-80, Type 3.
 2. Design: Y-pattern, horizontal or vertical flow.
 3. CWP Rating: 200 psi.
 4. Body: Bronze, ASTM B62.
 5. End Connections: Threaded or soldered.
 6. Disc: Bronze.
 7. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Milwaukee Valve: www.milwaukeevalve.com/#sle.
 - c. NIBCO INC: www.nibco.com/#sle.

2.05 BRONZE, GLOBE VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125:
 - 1. Class 125:
 - a. CWP Rating: 200 psi.
 - b. WSP Rating: 125 psi, saturated.
 - 2. Comply with MSS SP-80, Type 1.
 - 3. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 4. End Connections: Threaded or solder.
 - 5. Bonnet: NRS; Non-rising Stem.
 - 6. Non-Rising Stem: Bronze.
 - 7. Disc: Bronze.
 - 8. Packing: Asbestos free.
 - 9. Handwheel Operator: Malleable iron or bronze.
 - 10. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Milwaukee Valve: www.milwaukeevalve.com/#sle.
 - c. NIBCO INC: www.nibco.com/#sle.

2.06 LUBRICATED PLUG VALVES

- A. Regular Gland with Threaded Ends:
 - 1. Comply with MSS SP-78, Type II.
 - 2. Class 125: CWP Rating: 200 psi.
 - 3. Body: ASTM A48/A48M or ASTM A126, cast iron with lubrication sealing system.
 - 4. Pattern: Regular or short.
 - 5. Plug: Cast iron or bronze with sealant groove.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION 220523

**SECTION 220529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated trapeze-framed systems.
- B. Strut systems for pipe or equipment support.
- C. Beam clamps.
- D. Pipe hangers.
- E. Pipe rollers and roller supports.
- F. Pipe supports, guides, shields, and saddles.
- G. Nonpenetrating rooftop supports for low-slope roofs.
- H. Anchors and fasteners.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2023.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2024.
- G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- M. FM (AG) - FM Approval Guide; Current Edition.
- N. MFMA-4 - Metal Framing Standards Publication; 2004.
- O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- P. UL (DIR) - Online Certifications Directory; Current Edition.
- Q. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- B. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports.
- C. Installer's Qualifications: Include evidence of compliance with specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.
- B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.
- C. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
- D. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- E. Materials for Metal Fabricated Supports:
 - 1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
 - 2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.
- F. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.
 - 1. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - 2. Outdoor, Damp, or Wet-Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

2.02 PREFABRICATED TRAPEZE-FRAMED SYSTEMS

- A. Prefabricated Trapeze-Framed Metal Strut Systems:

1. Manufacturers:
 - a. Anvil International, LLC: www.asc-es.com/#sle.
 - b. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
 - c. Gripple, Inc: www.gripple.com/#sle.
 - d. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
 - e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. MFMA-4 compliant, pre-fabricated, MSS SP-58 Type 59 continuous-slot metal strut channel with associated tracks, fittings, and related accessories.
3. Strut Channel or Bracket Material:
 - a. Indoor Dry Locations: Use zinc-plated steel or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
6. Accessories: Provide bracket covers, clamps, fire-retarding brackets, protectors, and vibration dampeners.

2.03 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

- A. Strut Channels:
 1. Manufacturers:
 - a. Anvil International, LLC: www.asc-es.com/#sle.
 - b. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
 - c. Gripple, Inc: www.gripple.com/#sle.
 - d. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
 3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- B. Hanger Rods:
 1. Threaded zinc-plated steel unless otherwise indicated.
 2. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 2 inch: 3/8 inch diameter.
 - c. Piping 2-1/2 inch to 3 inch: 1/2 inch diameter.
 - d. Piping 4 inch to 6 inch: 5/8 inch diameter.
 - e. Piping 8 inch to 12 inch: 7/8 inch diameter.
 - f. Trapeze Support for Multiple Pipes: 1/2 inch diameter.
- C. Channel Nuts:
 1. Provide carbon steel channel nut with epoxy copper, galvanized steel, or zinc finish and long, regular, or short spring as indicated on drawings.

2.04 BEAM CLAMPS

- A. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
- B. C-Clamp: MSS SP-58 type 23, malleable iron and steel with zinc finish.
- C. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with zinc finish. For inverted usage provide manufacturer listed size(s).
- D. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with zinc finish.
- E. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with zinc finish.

- F. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, zinc finish.
- G. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- H. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.05 PIPE HANGERS

- A. Swivel Ring Hangers, Adjustable:
 - 1. MSS SP-58 type 10, epoxy-painted, zinc-colored.
 - 2. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 - 3. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
 - 4. Felt-Lined: Provide for uninsulated pipe to reduce noise and prevent static issues.
- B. Clevis Hangers, Adjustable:
 - 1. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
 - 2. Standard-Duty: MSS SP-58 type 1, zinc-plated.

2.06 PIPE CLAMPS

- A. Riser Clamps:
 - 1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
 - 2. MSS SP-58 type 1 or 8, carbon steel or steel with zinc plated finish.
 - 3. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
 - 4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.
- B. Strut Clamps:
 - 1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
- C. Insulation Coupling:
 - 1. Two bolt-type clamps designed for installation under insulation.
 - 2. Material: Carbon steel with epoxy copper or zinc finish.

2.07 PIPE ROLLERS AND ROLLER SUPPORTS

- A. MSS SP-58 type 43 based on required load, nonconductive and corrosion resistant.
- B. Steel Yoke Type: MSS SP-58 type 44, vertically adjustable, nonconductive, and corrosion resistant.
- C. Material: Zinc plated ASTM A36/A36M carbon steel.

2.08 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

- A. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- B. Stanchions:
 - 1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 - 2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
 - 3. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
- C. U-Bolts:
 - 1. MSS SP-58 type 24, zinc-coated carbon steel u-bolt for pipe support or anchoring.
- D. Pipe Shields for Insulated Piping:
 - 1. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
 - 2. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.

- b. Shields Material: galvanized steel.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Service Temperature: Minus 40 to 178 degrees F.
 - e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- E. Pipe Supports:
- 1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 - 2. Liquid Temperatures Up to 122 degrees F:
 - a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
 - b. Support From Below: MSS SP-58 types 35 through 38.
 - 3. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 type 1 or 3 through 12 clamps with appropriate saddle of MSS SP-58 type 40 for insulated pipe.
 - b. Roller Chair: MSS SP-58 types 41 or 43 through 46 roller chair support with appropriate saddle of MSS SP-58 type 39 for insulated pipe.
 - c. Sliding Support: MSS SP-58 types 35 through 38.
- F. Pipe Supports, Thermal Insulated:
- 1. General Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
 - c. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - d. Provide pipe supports for 1/2 to 30 inch iron pipes.
 - e. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
 - 2. PVC Jacket:
 - a. Pipe insulation protection shields to be provided.
 - b. Minimum Service Temperature: Minus 40 degrees F.
 - c. Maximum Service Temperature: 180 degrees F.
 - d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
 - e. Minimum Thickness: 60 mil, 0.06 inch.
 - f. Connections: Brush-on welding adhesive.

2.09 NONPENETRATING ROOFTOP SUPPORTS FOR LOW-SLOPE ROOFS

- A. Manufacturers:
 - 1. Anvil International: www.anvilintl.com/#sle.
 - 2. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
 - 3. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
- B. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
- C. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
- D. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
- E. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

2.10 ANCHORS AND FASTENERS

- A. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
- B. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
- C. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
- D. Hollow Masonry: Use toggle bolts.
- E. Hollow Stud Walls: Use toggle bolts.
- F. Steel: Use beam clamps.
- G. Plastic and lead anchors are not permitted.
- H. Powder-actuated fasteners are not permitted.
- I. Hammer-driven anchors and fasteners are not permitted.
- J. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
- K. Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - 1. Channel Material: Use galvanized steel.
 - 2. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
 - 3. Manufacturer: Same as manufacturer of metal strut channel framing system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- H. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

- I. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- J. Secure fasteners according to manufacturer's recommended torque settings.
- K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 220529

SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Ceiling tacks.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.03 SUBMITTALS

- A. Schedules:
 - 1. Submit plumbing component identification schedule listing equipment, piping, and valves.
 - 2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
 - 3. Valve Data Format: Include id-number, location, function, and model number.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Nameplates: Provide for equipment listed if not included with factory-provided nameplate.
 - 1. Heat exchangers, water heaters, and other heat transfer products.
 - 2. Control panels, transducers, and other related control equipment products.
 - 3. Pumps, tanks, filters, water treatment devices, and other plumbing equipment products.
- B. Tags:
 - 1. Piping: 3/4 inch diameter and smaller.
 - 2. Manual operated and automated control valves.
 - 3. Instrumentation, relays, gauges, and other related control equipment products.
 - 4. Ceiling tacks placed on lay-in ceiling surface to reference plumbing components.
- C. Pipe Markers: 3/4 inch diameter and higher.

2.02 NAMEPLATES

- A. Description: Engraved piece with up to three lines of text.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
 - 4. Nameplate Height: 2 inch.
 - 5. Nameplate Material: Material shall be suitable for environment where installed (i.e., corrosive, outdoors, etc.). Material shall allow for nameplate to be applied to curved surface, as applicable. Adhesive shall be suitable for surface where applied.
 - a. Flexible: Polyester with adhesive backing per ASTM D709.
 - b. Metal: Aluminum or stainless steel with adhesive backing and a hole per corner for screw fastening.

2.03 TAGS

- A. Metal: Aluminum or stainless steel, 19 gauge 1-1/2 inch in diameter with smooth edges, engraved, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.
- B. Valve Tag Chart: Typewritten 12-point letter size list in anodized aluminum frame.

- C. Piping: 3/4 inch diameter and smaller. Include corrosion resistant chain. Identify service, flow direction, and pressure.

2.04 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
- C. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- D. Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.
- E. Identification Scheme, ASME A13.1:
 - 1. Primary: External Pipe Diameter, Uninsulated or Insulated.
 - a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
 - b. 1-1/2 to 2 inches: Use 8 inch field-length with 3/4 inch text height.
 - c. 2-1/2 to 6 inches: Use 12 inch field-length with 1-1/4 inch text height.
 - 2. Secondary: Color scheme per fluid service.
 - a. Combustible Fluids: White text on brown background.
 - b. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.

2.05 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.
- B. Color code as follows:
 - 1. Plumbing Equipment: Yellow.
 - 2. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

- A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags in clear view and align with axis of piping
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Apply ASME A13.1 Pipe Marking Rules:
 - 1. Place pipe marker adjacent to changes in direction.
 - 2. Place pipe marker adjacent each valve port and flange end.
 - 3. Place pipe marker at both sides of floor and wall penetrations.
 - 4. Place pipe marker every 25 to 50 feet interval of straight run.
- G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 220553

**SECTION 220719
PLUMBING PIPING INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible elastomeric cellular insulation.
- B. Glass fiber insulation.
- C. Jacketing and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2024).
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2025.
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- F. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation; 2021.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- H. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- I. SAE AMS3779 - Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant, Aluminum Coated Glass Cloth; 2016b.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Owens Corning Corporation: www.owenscorning.com/en-us/#sle.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.
 - 1. K Value: ASTM C177, 0.23 at 75 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 pcf density.
 - 3. Weave: 5 by 5.
- H. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Aeroflex USA: www.aeroflexusa.com/#sle.
 - 2. Armacell LLC: www.armacell.us/#sle.
 - 3. K-Flex USA LLC: www.kflexusa.com/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- D. Weather Barrier: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.

2.04 JACKETING AND ACCESSORIES

- A. PVC Plastic Jacket:
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil, 0.010 inch.
 - e. Connections: Brush on welding adhesive.
 - 2. Covering Adhesive Mastic: Compatible with insulation.
- B. Reinforced Tape:
 - 1. All Service Jacket tape suitable for sealing seams between insulation, insulated pipe bends, and fittings resulting in a tight, smooth surface without wrinkles.

2. Comply with UL 723 or ASTM E84.
3. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
4. Finish: Match insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

3.03 SCHEDULES

- A. Plumbing Systems:
 1. Domestic Hot Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1 inch.
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1 inch.
 2. Domestic Hot Water Recirculation:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1 inch.

- b. Cellular Foam Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1 inch.
 - 3. Domestic Cold Water:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: ≥1-1/2 inch.
 - (a) Thickness: 1 inch.
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: ≥1-1/2 inch.
 - (a) Thickness: 1 inch.
 - 4. Plumbing Vents Within 10 Feet of the Exterior:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All pipe sizes.
 - (a) Thickness: 1 inch.
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: All pipe sizes.
 - (a) Thickness: 1 inch.
- B. Cooling Systems:
- 1. Condensate Drains from Cooling Coils:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: ≥1-1/2 inch.
 - (a) Thickness: 1 inch.
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: <1-1/2 inch.
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: ≥1-1/2 inch.
 - (a) Thickness: 1 inch.

END OF SECTION 220719

**SECTION 221005
PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet of building.
- B. Sanitary waste piping, above grade.
- C. Domestic water piping, buried within 5 feet of building.
- D. Domestic water piping, above grade.
- E. Natural gas piping, buried within 5 feet of building.
- F. Natural gas piping, above grade.
- G. Pipe flanges, unions, and couplings.
- H. Pipe hangers and supports.
- I. Flow-balancing valves.
- J. Pressure reducing valves.
- K. Pressure relief valves.
- L. Pressure-temperature valves.
- M. Strainers.

1.02 RELATED REQUIREMENTS

- A. Section 220516 - Expansion Fittings and Loops for Plumbing Piping.
- B. Section 220529 - Hangers and Supports for Plumbing Piping and Equipment.
- C. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- D. Section 220553 - Identification for Plumbing Piping and Equipment.
- E. Section 220719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ANSI LC 1/CSA 6.26 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing; 2023.
- B. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- F. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.
- G. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.
- H. ASME B31.1 - Power Piping; 2024.
- I. ASME B31.9 - Building Services Piping; 2025.
- J. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023, with Errata (2024).
- K. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2025.
- L. ASSE 1003 - Water Pressure Reducing Valves for Potable Water Distribution Systems; 2023.

- M. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- N. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- O. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- P. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2024.
- Q. ASTM B32 - Standard Specification for Solder Metal; 2020.
- R. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- S. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- T. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.
- U. ASTM B813 - Standard Specification for Water Flushable Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2024.
- V. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.
- W. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- X. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.
- Y. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).
- Z. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2024.
- AA. 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).
- BB. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2024, with Editorial Revision (2025).
- CC. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- DD. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
- EE. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- FF. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.
- GG. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2024.
- HH. AWWA C651 - Disinfecting Water Mains; 2023.
- II. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
- JJ. 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.
- KK. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- LL. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- MM. NSF 372 - Drinking Water System Components - Lead Content; 2024.
- NN. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Plenum-Installed Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY WASTE PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. Copper Tube: ASTM B306, DWV.
 - 1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, solvent.
 - 2. Joints: ASTM B32, alloy Sn50 solder.
- C. PVC Pipe: ASTM D2665.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

- B. Ductile Iron Pipe: AWWA C151/A21.51.
 - 1. Fittings: Ductile or gray iron, standard thickness.
 - 2. Joints: AWWA C111/A21.11, styrene butadiene rubber (SBR) or vulcanized SBR gasket with 3/4 inch diameter rods.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.06 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M, Grade B, Type E, Schedule 40 black.
 - 1. Fittings: ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: ASME B31.1, welded.
 - 3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.07 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Grade B, Type E, Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.
- B. Flexible Gas Piping:
 - 1. Corrugated Stainless Steel Tubing: Comply with ANSI LC 1/CSA 6.26.
 - 2. Comply with ASTM E84.
 - 3. Fittings: Provided by piping system manufacturer.

2.08 PIPE FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 2 inch and Under:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
 - 2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Sizes Over 2 inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. No-Hub Couplings:
 - 1. Testing: In accordance with ASTM C1277 and CISPI 310.
 - 2. Gasket Material: Neoprene complying with ASTM C564.
 - 3. Band Material: Stainless steel.
 - 4. Eyelet Material: Stainless steel.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.09 PIPE HANGERS AND SUPPORTS

- A. See Section 220529 for additional requirements.
- B. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:

- a. Bases: High-density polypropylene.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment and Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
- C. Plumbing Piping - Drain, Waste, and Vent:
- 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
 - 4. Wall Support for Pipe Sizes 4 inch and Over: Welded steel bracket and wrought steel clamp.
 - 5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- D. Plumbing Piping - Water:
- 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes Up to 3 inch: Cast iron hook.
 - 4. Wall Support for Pipe Sizes 4 inch and Larger: Welded steel bracket and wrought steel clamp.
 - 5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.10 FLOW-BALANCING VALVES

- A. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.11 PRESSURE REDUCING VALVES

- A. 2 inch and Smaller:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
 - 2. Pressure Reducing Pilot-Operator:
 - a. Operating Range: 5 to 80 psi.
 - b. Connected into bronze pilot piping and fittings.
 - c. Fixed flow restrictor, pressure gauges, and isolation valves.
- B. 2 inch and Larger:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.
 - 2. Pressure Reducing Pilot-Operator:
 - a. Operating Range: 5 to 80 psi.
 - b. Connected into bronze or stainless steel pilot piping and fittings.
 - c. Fixed flow restrictor, strainer, pressure gauges, and isolation valves.

2.12 PRESSURE RELIEF VALVES

- A. ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

2.13 PRESSURE-TEMPERATURE VALVES

- A. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.14 STRAINERS

- A. Size 1/2 inch to 2 inch:
 - 1. Class 150, threaded or soldered forged dezincified-resistant bronze Y-pattern body, stainless steel perforated mesh screen with cap, and rated for 150 psi, 250 deg F WOG service.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 220516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
 - 1. See Section 220719.
- H. Provide access where valves and fittings are not exposed.
- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
- L. Install bell and spigot pipe with bell end upstream.
- M. Install valves with stems upright or horizontal, not inverted. See Section 220523.
- N. Install water piping to ASME B31.9.
- O. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- P. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- Q. Sleeve pipes passing through partitions, walls, and floors.
- R. Pipe Hangers and Supports:
 - 1. Install in accordance with MSS SP-58.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 8. Provide copper plated hangers and supports for copper piping.
 9. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Section 220548.
 10. Support cast iron drainage piping at every joint.
- S. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe valves for throttling, bypass, or manual flow control services.
- E. Provide spring-loaded check valves on discharge of water pumps.
- F. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 FIELD TESTS AND INSPECTIONS

- A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
- B. Domestic Water Systems:
 1. Perform hydrostatic testing for leakage prior to system disinfection.
 2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
 3. General:
 - a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.
 4. Metal Piping Systems Subject to Freezing Conditions:
 - a. Inject 40 psi of compressed air into piping to spot check for leaks with liquid soap. Document and repair leaks as necessary.
 - b. Raise injected compressed air pressure to 1.5 times rated service pressure or minimum pressure of 100 psi for a duration of 2 hours and verify with a gauge that no perceptible pressure drop is measured.
- C. Gas Distribution Systems:
 1. Test Preparation: Close each appliance valve or disconnect and cap each connected appliance.
 2. General Systems:
 - a. Inject a minimum of 10 psi of compressed air into the piping system for a duration of 15 minutes and verify with a gauge that no perceptible pressure drop is measured.
 - b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound.
 3. Welded Pipes or Systems with Service Pressures Above 14 in-wc:

- a. Inject a minimum of 60 psi of compressed air into the piping system for a duration of 30 minutes and verify with a gauge that no perceptible pressure drop is measured.
- b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound with 1 psi increments.

D. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed, and clean.
- B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.08 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved double check backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
 - 1. Provide 18 gauge, 0.0478-inch galvanized sheet metal sleeve around service main to 6 inch above floor and 1 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

3.09 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inch to 1-1/4 inch:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inch to 2 inch:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inch to 3 inch:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.
 - d. Pipe Size: 4 inch to 6 inch:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 5/8 inch.
 - 2. Plastic Piping:
 - a. Pipe Size: 1/2 inch to 2 inch:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - b. Pipe Size: 2-1/2 inch to 4 inch:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.

- c. Pipe Size: 6 inch:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 5/8 inch.

END OF SECTION 221005

**SECTION 221006
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Hydrants.
- E. Washing machine outlet boxes.
- F. Ice maker outlet boxes.
- G. Double check valve assemblies.
- H. Water hammer arrestors.
- I. Sanitary waste interceptors.
- J. Mixing valves.

1.02 REFERENCE STANDARDS

- A. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings; 2010.
- B. ASME A112.6.3 - Floor Drains; 2022.
- C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.
- D. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies; 2021.
- E. ASSE 1016 - Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations; 2017 (Reaffirmed 2021).
- F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2023.
- G. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
- H. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- I. NSF 372 - Drinking Water System Components - Lead Content; 2024.
- J. PDI-WH 201 - Water Hammer Arresters; 2017.

1.03 SUBMITTALS

- A. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Loose Keys for Outside Hose Bibbs: One.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Jay R. Smith: www.jrsmith.com/home#sle.

2. Josam Company: www.josam.com/#sle.
 3. MIFAB, Inc: www.mifab.com/#sle.
 4. Sioux Chief: www.siouxchief.com/#sle.
 5. Watts: www.watts.com/#sle.
 6. Zurn: www.zurn.com/us/en.html#sle.
- B. Floor Drain (Emergency / Shower):
1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, 1/2" diameter trap primer connection, and round, adjustable nickel-bronze strainer.

2.03 CLEANOUTS

- A. Cleanouts at Exterior Surfaced Areas:
1. Round cast nickel bronze access frame and non-skid cover.
- B. Cleanouts at Exterior Unsurfaced Areas:
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- C. Cleanouts at Interior Finished Floor Areas:
1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- D. Cleanouts at Interior Finished Wall Areas:
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- E. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.04 HOSE BIBBS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 2. Watts Regulator Company: www.wattsregulator.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Interior Hose Bibbs:
1. Bronze or brass with mounting flange, replaceable seat, hose thread spout, and integral or add-on vacuum breaker complying with ASSE 1011.
 2. Finishes:
 - a. Exposed Locations: Polished chrome.
 - b. Mechanical and Equipment Rooms: Rough bronze.
 3. Operation:
 - a. Exposed Locations: Operating key.
 - b. Mechanical and Equipment Rooms: Handwheel, T-handle, or lever.

2.05 HYDRANTS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 2. MIFAB, Inc: www.mifab.com/#sle.
 3. Watts: www.watts.com/#sle.
 4. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Wall Hydrants:
1. ASSE 1019, freeze resistant, self-draining, hose thread spout, and integral vacuum breaker.
 - a. Installation: Lockable recessed box.
 - b. Finish: Polished bronze.
 - c. Operation: Operating key.

2.06 WASHING MACHINE OUTLET BOXES

- A. Manufacturers:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.
 - 2. Oatey Supply Chain Services, Inc: www.oatey.com/#sle.
 - 3. Sioux Chief: www.siouxchief.com/#sle.
 - 4. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Description: Plastic preformed rough-in box with brass quarter-turn ball valves, socket for 2 inch waste, and slip-in finishing cover.
- C. Provide fire-rated outlet-box assembly for installation in 1- and 2-hour rated walls.
- D. Accessories:
 - 1. Water-hammer arrestors.
 - 2. Support brackets for installation between framing studs.

2.07 ICE MAKER OUTLET BOXES

- A. Manufacturers:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.
 - 2. Oatey Supply Chain Services, Inc: www.oatey.com/#sle.
 - 3. Sioux Chief: www.siouxchief.com/#sle.
 - 4. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Description: Plastic preformed square rough-in box with brass quarter-turn ball valve, and slip-in finishing cover.
- C. Provide fire-rated outlet-box assembly for installation in 1- and 2-hour rated walls.
- D. Accessories:
 - 1. Water-hammer arrestors.
 - 2. Support brackets for installation between framing studs.

2.08 DOUBLE CHECK-VALVE ASSEMBLIES

- A. Manufacturers:
 - 1. Apollo Valves: www.apollovalves.com/#sle.
 - 2. MIFAB, Inc: www.mifab.com/#sle.
 - 3. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 - 4. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Double Check Valve Assembly:
 - 1. ASSE 1015 and NSF 61 compliant lead-free bronze body assembly with corrosion resistant internal parts, stainless steel springs, intermediate atmospheric vent, two independently-operating check valves, and test-cock plug for horizontal or vertical mount.
 - 2. Size: 3/4 to 2 inch, NPS assembly with threaded full port ball valves.
 - 3. Maximum Working Parameters: 175 psi at 180 degrees F.
 - 4. Accessories: Provide lead-free Y-strainer and test cock.

2.09 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 - 2. MIFAB, Inc: www.mifab.com/#sle.
 - 3. Sioux Chief: www.siouxchief.com/#sle.
 - 4. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 - 5. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Water Hammer Arrestors:

1. Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.10 SANITARY WASTE INTERCEPTORS

- A. Manufacturers:
 1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 2. MIFAB, Inc: www.mifab.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Oil Interceptors with Integral Oil Storage Compartment:
 1. Construction:
 - a. Material: Epoxy coated fabricated steel.
 - b. Rough-in: Fully recessed.
 - c. Accessories: Integral deep seal trap, removable integral flow control, adjustable draw-off assembly, sediment bucket, integral oil storage compartment, high oil level sensor and control panel.
 - d. Cover: AASHTO M306 traffic rated (H-20), epoxy coated, non-skid with gasket, securing handle, flush with concrete slab, with extension as required.

2.11 MIXING VALVES

- A. Water Temperature Limiting Valves:
 1. Manufacturers:
 - a. Leonard Valve Company: www.leonardvalve.com/#sle.
 - b. Watts Water Technologies; POWERS: www.watts.com/#sle.
 - c. Zurn Industries, LLC;: www.zurn.com/#sle.
 2. Valve: ASSE 1070, bronze or brass body; thermostatic element; corrosion- and lime-resistant internal components; integral locking temperature adjustment with high-temperature limit stop; integral check valves with strainer screens on inlets.
 3. Provide the following performance characteristics for lavatories in public toilet facilities.
 - a. Mixed-Water Temperature Setting: [110] degrees F.
- B. Automatic Compensating Valves for Individual Showers and Tub and Shower Combinations:
 1. Manufacturers:
 - a. Leonard Valve Company: www.leonardvalve.com/#sle.
 - b. Symmons Industries: www.symmons.com/#sle.
 - c. Watts Water Technologies; POWERS: www.watts.com/#sle.
 2. Valve: ASSE 1016, combination thermostatic and pressure balancing, bronze or brass body with inlet checkstops; integral volume and temperature control with adjustable high-temperature limit stop.
 3. Valve Trim: Escutcheon with ADA-compliant lever handle.
 4. Provide the following performance characteristics for showers.
 - a. Mixed-Water Temperature Setting: [120] degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

- F. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, toilets, urinals, ice maker outlets, washing machine outlets, and dishwashing outlets.

END OF SECTION 221006

**SECTION 223000
PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial gas-fired water heaters.
- B. Diaphragm-type compression tanks.
- C. In-line circulator pumps.

1.02 REFERENCE STANDARDS

- A. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2019 (Reaffirmed 2024).
- B. 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).
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2025, with Errata .
- E. AWWA C652 - Disinfection of Water-Storage Facilities; 2019.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Product Data: Provide manufacturer's literature and data sheets for each product. Include information on materials of fabrication, assembly of components, dimensions, weights, capabilities, performance, electrical characteristics, location and sizes of connections, service and access locations, and manufacturer-provided and field-installed accessories.
- B. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Certifications:
 - 1. Water Heaters: NSF approved.
 - 2. Gas Water Heaters: ANSI Z21.10.1 and ANSI Z21.10.3.
 - 3. Water Tanks: ASME labeled to ASME BPVC-VIII-1.
 - 4. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.07 WARRANTY

- A. Manufacturer Warranty: Provide 5-year manufacturer warranty for water storage tanks and 1-year manufacturer warranty for component parts. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 WATER HEATERS

- A. Manufacturers:
 - 1. A.O. Smith Water Products Co: www.hotwater.com/#sle.
 - 2. Bradford White Corporation: www.bradfordwhite.com/#sle.
 - 3. Lochinvar: www.lochinvar.com/en_US/home#sle.
 - 4. Rheem Manufacturing Company: www.rheem.com/#sle.
- B. Commercial Gas-Fired Water Heaters:
 - 1. Type: Automatic, natural gas-fired, vertical storage.
 - 2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
 - 3. Performance: As scheduled.
 - 4. Tank: Antimicrobial-infused, enamel-lined, welded steel, ASME labeled; multiple flue passages, 4-inch diameter inspection port, thermally insulated with minimum 2 inches foam plastic, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
 - 5. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.
 - c. Drain valve.
 - d. Anode: Magnesium.
 - e. Temperature and Pressure Relief Valve: ASME labeled.
 - 6. Applications:
 - a. Automatic storage water heater.
 - b. For operation at 180 degrees F.
 - 7. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.

2.02 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com/#sle.
 - 2. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 3. Taco, Inc: www.taco-hvac.com/#sle.
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

2.03 IN-LINE CIRCULATOR PUMPS

- A. Manufacturers:
 - 1. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 2. Grundfos: www.grundfos.com/us#sle.
 - 3. Taco, Inc: www.taco-hvac.com/#sle.
- B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
- C. Impeller: Bronze.
- D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- E. Seal: Carbon rotating against a stationary ceramic seat.
- F. Drive: Flexible coupling.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions required for applicable certifications.
- B. Electrical Work: Provide automatic control and protective devices with associated wiring to interconnect related interfaced devices required for specified operation.
- C. Coordinate system, equipment, and piping work with applicable electrical, fuel, gas, vent, drain, and waste support interconnections as included or provided by other trades.
- D. Domestic Hot Water Storage Tanks:
 - 1. Provide steel pipe support, independent of building structural framing members.
 - 2. Clean and flush prior to delivery to site. Seal until pipe connections are made.
- E. Pumps:
 - 1. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
 - 2. Provide pressure gauges on suction and discharge sides of pump.
 - 3. Decrease from line size with reducers, as required. Support piping adjacent to pump such that no weight is carried on pump casings.
 - 4. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

3.02 CLEANING

- A. Clean interior of water tanks and disinfect in accordance with AWWA C652.

**SECTION 224000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush valve water closets.
- B. Lavatories.
- C. Sinks.
- D. Under-lavatory pipe supply covers.
- E. Bi-level, electric water coolers.
- F. Service sinks.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).
- C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- D. ASME A112.18.1 - Plumbing Supply Fittings; 2024.
- E. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2022).
- F. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2024.
- G. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.
- H. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.
- I. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- K. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- L. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's literature and data sheets for each product. Include materials of fabrication, rough-in requirements, location and sizes of connections, configurations, dimensions, finishes, features, and accessories.
 - 1. For electrically powered fixtures, include electrical characteristics.
- B. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 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.

1.05 WARRANTY

- A. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide drinking water system components certified as complying with NSF 61 and NSF 372.
- B. ADA: Where indicated to be ADA-compliant, provide fixtures complying with ADA Standards and ICC A117.1.
- C. Maximum Fixture Supply Pressure: 80 psi unless stated otherwise.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.

2.03 FLUSH VALVE WATER CLOSETS

- A. Water Closets:
 - 1. Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
 - 2. Flush Valve: Exposed (top spud).
 - 3. Flush Operation: Manual, oscillating handle.
 - 4. Handle Height: 44 inches or less.
 - 5. Inlet Size: 1-1/2 inches.
 - 6. Trapway Outlet: 4 inch.
 - 7. Color: White.
 - 8. Manufacturers:
 - a. American Standard: www.americanstandard-us.com/#sle.
 - b. Kohler Company: www.kohler.com/#sle.
 - c. Sloan Valve Company: www.sloanvalve.com/#sle
 - d. Toto: www.totousa.com/#sle.
 - e. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Flush Valves:
 - 1. Valve Supply Size: 1 inch.
 - 2. Valve Outlet Size: 1-1/2 inches.
 - 3. Manufacturers:
 - a. American Standard: www.americanstandard-us.com/#sle.
 - b. Kohler Company: www.kohler.com/#sle.
 - c. Sloan Valve Company: www.sloanvalve.com/#sle.
 - d. Toto: www.totousa.com/#sle.
 - e. Zurn Industries, LLC: www.zurn.com/#sle.
 - 4. Manual Operated:
 - a. Type: ASME A112.18.1 or ASME A112.19.5; diaphragm type complete with vacuum breaker stops, and accessories.
 - b. Supplied Volume Capacity: 1.6 gal per flush.
 - 5. Exposed Type: Chrome-plated, escutcheon, integral screwdriver stop.
- C. Toilet Seats:
 - 1. Manufacturers:
 - a. American Standard: www.americanstandard-us.com/#sle.
 - b. Bemis Manufacturing Company: www.bemismfg.com/#sle.
 - c. Kohler Company: www.kohler.com/#sle.
 - d. Toto: www.totousa.com/#sle.
 - e. Zurn Industries, LLC: www.zurn.com/#sle.
 - 2. Plastic: White finish, elongated shape, open front, self-sustaining hinge, brass bolts, without cover.

2.04 LAVATORIES

- A. Manufacturers:

1. American Standard: www.americanstandard-us.com/#sle.
 2. Kohler Company: www.kohler.com/#sle.
 3. Sloan Valve Company: www.sloanvalve.com/#sle.
 4. Toto: www.totousa.com/#sle.
 5. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Wall-Hung Basin:
1. Vitreous China, Grade A: ASME A112.19.2; white, rectangular commercial-grade sink with predrilled holes, rear-center drain, front overflow, and hanger. Size as indicated on drawings with single faucet hole.
 2. Carrier:
 - a. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.
- C. Under-Mount Basin:
1. Vitreous China: ASME A112.19.2; white interior, rectangular shape, front overflow, seal of putty, caulking, or concealed vinyl gasket, and white exterior finish. Size as indicated on drawings.
- D. Supply Faucet:
1. Deck Mounted Faucet Manufacturers:
 - a. American Standard: www.americanstandard-us.com/#sle
 - b. Kohler Company: www.kohler.com/#sle.
 - c. Toto: www.totousa.com/#sle.
 - d. Zurn Industries, LLC: www.zurn.com/#sle.
 2. ASME A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator with maximum flow of 0.5 gpm, single lever handle.
- E. Thermostatic Mixing Valve:
1. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.
- F. Accessories:
1. Chrome-plated 17 gauge, 0.0538 inch brass P-trap with clean-out plug and arm with escutcheon.
 2. Wheel handle stops.
 3. Flexible supplies.

2.05 SINKS

- A. Manufacturers:
1. American Standard: www.americanstandard-us.com/#sle.
 2. Elkay Manufacturing Company: www.elkay.com/#sle.
 3. Kohler Company: www.kohler.com/#sle.
- B. Undermount-Installed Single Compartment Bowl:
1. ASME A112.19.3, stainless steel, 18 gauge, 0.050 inch, type 304 stainless steel.
 2. Undercoated bottom sound deadening pads.
 3. Drain: 3-1/2 inch, stainless steel with strainer, crumb cup, and tailpiece.
- C. Undermount-Installed Double Compartment Bowl:
1. ASME A112.19.3, stainless steel, 18 gauge, 0.050 inch, type 304 stainless steel.
 2. Undercoated with bottom sound deadening pads.
 3. Bowl Proportion: Equally sized.
 4. Drain: 3-1/2 inch, stainless steel with strainer, crumb cup, and tailpiece.
- D. Faucets:
1. Manufacturers:
 - a. American Standard: www.americanstandard-us.com/#sle.
 - b. Elkay Manufacturing Company: www.elkay.com/#sle.

- c. Kohler Company: www.kohler.com/#sle.
- 2. Single Handle Faucet with Three-Function Pulldown Spray Head:
 - a. Minimum Spout Height: 8 inch.
 - b. Minimum Spout Reach: 8-1/4 inch.
 - c. Type: Deck-mount, swivel faucet with mounting plate.
 - d. Spray Functions: Stream, full spray and pause at 1.5 gpm, maximum.
 - e. ASME A112.18.1, ADA Standards, and NSF 61 compliant assembly.
 - f. Materials: Ceramic disc-cartridge valve on brass body with polished chrome finish.
- E. Accessories: Provide braided water supply lines, slip-joint p-trap, and stainless steel basket strainer.

2.06 UNDER-LAVATORY PIPE SUPPLY COVERS

- A. General:
 - 1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
 - 2. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
 - a. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
 - b. Comply with ICC A117.1.
 - 3. Color: High gloss white.
 - 4. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.07 BI-LEVEL, ELECTRIC WATER COOLERS

- A. Manufacturers:
 - 1. Elkay Manufacturing Company: www.elkay.com/#sle.
 - 2. Haws Corporation: www.hawesco.com/#sle.
 - 3. Murdock Manufacturing: www.murdockmfg.com/home#sle.
 - 4. Oasis International: www.oasiscoolers.com/#sle.
- B. Water Cooler: Bi-level, electric, mechanically refrigerated; surface mounted, ADA compliant; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
 - 1. Capacity: 8 gph of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
 - 2. Electrical: 115 VAC, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.
- C. Bottle Filler: Materials to match fountain.

2.08 SERVICE AND UTILITY SINKS

- A. Manufacturers:
 - 1. E.L. Mustee & Sons, Inc: www.mustee.com/#sle.
 - 2. Fiat Products: www.fiatproducts.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Service Sink Bowl: 24 by 24 by 10 inches high, white molded stone, floor mounted, with 1-inch wide shoulders, vinyl bumper guard, stainless steel strainer.
 - 1. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
 - 2. Accessories:
 - a. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
 - b. Hose clamp hanger.
 - c. Mop hanger.

- C. Self-Standing, Single-Bowl, Laundry (Utility) Sink: faucet holes on 4" centers, white finished, plastic-molded bowl, 19 gal capacity with integral-molded drain and stopper. Size as indicated on drawings.
 - 1. Trim: ASME A112.18.1 deck-mount single handle faucet with two-function pull-out spray head, ceramic disc-cartridge, polished chrome finish .

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify walls, floors, and finishes are prepared and ready for installation of fixtures.
- B. Verify rough-ins for field connections match sizes and locations shown on drawings.
- C. Verify electric power is available and of the correct characteristics.
- D. Verify casework and countertops are prepared and ready for installation of fixtures.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install components level and plumb.
- C. Secure fixtures in place.
- D. Install rigid or flexible supplies to fixtures. Provide supply stops, reducers, and escutcheons.

3.03 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Repair or replace damaged or defective products.
- C. Test fixtures after installation to verify operation. Correct deficiencies.

3.04 ADJUSTING

- A. Adjust stops and valves so fixtures operate without splashing, noise, or overflow.

3.05 CLEANING

- A. Clean plumbing fixtures to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.

END OF SECTION 224000

**SECTION 224017
BATHTUBS AND SHOWERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bathtub and shower faucets, valves, and trim.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2024.
- C. ASSE 1016 - Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations; 2017 (Reaffirmed 2021).
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- E. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- F. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's literature and data sheets for each product. Include materials of fabrication, rough-in requirements, location and sizes of connections, configurations, dimensions, finishes, features, and accessories.
- B. Operation and Maintenance Data: Provide for the following:
 - 1. For bathtub and shower faucets, valves, and trim: Provide exploded view and replacement parts list.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.
- C. Store products indoors in clean, dry area. Protect from water and dirt. Elevate above floor.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide supply fixtures, fittings, valves, and trim certified as complying with NSF 61 and NSF 372.
- B. ADA: Where indicated to be ADA-compliant, provide fixtures complying with ADA Standards and ICC A117.1.
- C. Maximum Fixture and Faucet Supply Pressure: 80 psi unless stated otherwise.

2.02 BATHTUB AND SHOWER FAUCETS, VALVES, AND TRIM

- A. Shower Valves and Trim:
 - 1. Manufacturers:
 - a. American Standard: www.americanstandard-us.com/#sle.
 - b. Delta Faucet Company: www.deltafaucet.com/#sle.
 - c. Kohler Company: www.kohler.com/#sle.
 - 2. Assembly: ASME A112.18.1, with control valve, shower head, and arm.
 - 3. Control Valve: ASSE 1016, pressure-balancing, brass or bronze body with inlet checkstops; integral volume and temperature control with adjustable high-temperature limit stop.
 - 4. Finish: As indicated on drawings.
 - 5. Flow Rate: Maximum 2.5 gpm at 80 psi.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify walls, floors, and finishes are prepared and ready for installation of fixtures.
- B. Verify rough-ins for field connections match sizes and locations shown on drawings.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install products level and plumb.
- C. Secure fixtures in place.

3.03 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Repair or replace damaged or defective products.
- C. Test fixtures after installation to verify operation. Correct deficiencies.

3.04 CLEANING

- A. Clean fixtures to remove dirt, fingerprints, paint, and other foreign material. Restore finishes to match original factory finish.

3.05 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.

END OF SECTION 224017

**SECTION 224223
COMMERCIAL SHOWERS, RECEPTORS AND BASES**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI 117 - Standard Specification for Structural Glued Laminated Timber of Softwood Species; 2020.
- B. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; 2013a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- D. ASTM F446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area; 2019.

1.02 SUMMARY INCLUDES

- A. CODE COMPLIANT ONE-PIECE SHOWER UNITS FOR SENIOR LIVING
- B. Basis of Design: Comfort Designs Bathware XST 5050 (MP5050) BF 1.0 5P AcrylX Alcove Five-Piece Shower

1.03 RELATED SECTIONS

- A. Section 22 42 00 Commercial Plumbing Fixtures
- B. Section 22 42 19 Commercial Bathtubs
- C. Section 22 43 00 Healthcare Plumbing Fixtures
- D. Section 22 43 19 Healthcare Bathtubs
- E. Section 22 43 23 Healthcare Showers
- F. Section 22 46 19 Security Showers

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Include construction details, material descriptions, dimensions, profiles and finishes for showers and basins.
 - 2. Include rated capacities, operating characteristics and furnished specialties and accessories.
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's packaging until ready for installation.

1.06 WARRANTY

- A. Provide manufacturer's 30-year limited warranty. PART 2 PRODUCTS

1.07 MANUFACTURERS

- A. Acceptable Manufacturer: COMFORT DESIGNS, a division of PRAXIS COMPANIES, 435 Industrial Road, Savannah, TN 38372; Toll Free Tel: 800.443.7269; Email: christina@imitoday.com | Web: www.comfortdesignsbathware.com .
- B. Basis of Design
1. Manufacturer: Comfort Designs Bathware
 2. Model: XST 5050 (MP5050) BF 1.0 5P
 3. Description: 5 Piece shower unit with center trench drain
 4. Material: AcrylX™ applied acrylic over reinforced composite
 5. Wall Finish: Smooth square tile pattern
 6. Color: White (stock); Biscuit and Bone (optional); custom colors available upon request
 7. Size:
 - a. Exterior: 50 1/2" x 50 1/8" x 77 3/4
 8. Configuration:
 - a. 1" Profile Height
 - b. AcrylX™ Finish
 - c. GripSure Textured Floor
 - d. Designed for On-Slab Installation when fully equipped
 - e. Center Drain
 9. Code Compliance:
 - a. NAHB
 - b. HUD
 - c. BOCA
 - d. HUD UM73a
 - e. ANSI Z124.1.2
 - f. CAN/CSA-B45-02
- C. Options (Specify as required):
1. Grab bars (compliant configurations)
 2. Fold-up seat
 3. Pressure balancing mixing valve
 4. Hand-held shower with slide bar
 5. Soap dish (large or small)
 6. Curtain rod and/or shower curtain (shipped loose)
- D. Substitutions
1. Submit for approval in accordance with Division 01
 2. Must match Basis of Design in:
 - a. Overall dimensions and configuration
 - b. Drain location and skirt height
 - c. Accessibility compliance
 - d. Material and wall finish

PART 3 EXECUTION

2.01 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.

2.02 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.

2.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

2.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products after Substantial Completion.

END OF SECTION

**SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2023.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2024.
- G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- I. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- L. FM (AG) - FM Approval Guide; Current Edition.
- M. MFMA-4 - Metal Framing Standards Publication; 2004.
- N. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- O. UL (DIR) - Online Certifications Directory; Current Edition.
- P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- B. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

- A. Comply with applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of HVAC work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Prefabricated Trapeze-Framed Metal Strut Systems:
 1. Manufacturers:
 - a. Anvil International, LLC: www.asc-es.com/#sle.
 - b. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
 - c. Gripple, Inc: www.gripple.com/#sle.
 - d. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MFMA-4 compliant, pre-fabricated, MSS SP-58 type 59 continuous-slot metal strut channel with associated tracks, fittings, and related accessories.
 3. Strut Channel or Bracket Material:
 - a. Indoor Dry Locations: Use zinc-plated steel or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.

4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
 5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
 6. Accessories: Provide bracket covers, clamps, fire-retarding brackets, protectors, and vibration dampeners.
- C. Strut Channels:
1. Manufacturers:
 - a. Anvil International, LLC: www.asc-es.com/#sle.
 - b. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
 - c. Gripple, Inc: www.gripple.com/#sle.
 - d. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or HVAC equipment support.
 3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- D. Channel Nuts:
1. Provide carbon steel channel nut with epoxy copper, galvanized steel, or zinc finish and long, regular, or short spring.
- E. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
 2. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 2 inch: 3/8 inch diameter.
 - c. Piping 2-1/2 inch to 3 inch: 1/2 inch diameter.
 - d. Piping 4 inch to 6 inch: 5/8 inch diameter.
 - e. Piping 8 inch to 12 inch: 7/8 inch diameter.
 - f. Trapeze Support for Multiple Pipes: 3/8 inch diameter.
- F. Thermal Insulated Pipe Supports:
1. General Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch iron pipes.
 - d. Chilled water application: Insulation inserts to consist of cellular glass insulation surrounded by a 360 degree, PVC jacketing.
 - e. Heating water application: Insulation inserts to consist of calcium silicate insulation surrounded by a 360 degree, PVC jacketing.
 2. PVC Jacket:
 - a. Pipe insulation protection shields to be provided.
 - b. Minimum Service Temperature: Minus 40 degrees F.
 - c. Maximum Service Temperature: 180 degrees F.
 - d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
 - e. Thickness: 60 mil.
 - f. Connections: Brush on welding adhesive.
 3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
- G. Pipe Supports:

1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 2. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 3. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
 - b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
- H. Pipe Stanchions:
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
 3. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
- I. Beam Clamps:
1. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
 2. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with zinc finish.
 3. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with zinc finish. For inverted usage provide manufacturer listed size(s).
 4. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with zinc finish.
 5. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with zinc finish.
 6. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, zinc finish,
 7. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
 8. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
- J. Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
 2. MSS SP-58 type 1 or 8, carbon steel or steel with stainless steel or zinc plated finish.
 3. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel or stainless steel with stainless steel or zinc plated finish.
 4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
 5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.
- K. U-Bolts:
1. MSS SP-58 Type 24, zinc-coated carbon steel u-bolt for pipe support or anchoring.
- L. Strut Clamps:
1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper, stainless steel, or zinc finish.
 2. Service Temperature Range: Minus 65 to 275 degrees F.
- M. Insulation Clamps:
1. Two bolt-type clamps designed for installation under insulation.
 2. Material: Carbon steel with epoxy copper or zinc finish.
- N. Pipe Hangers:
1. Split Ring Hangers:
 - a. Provide hinged split ring hanger with epoxy copper or zinc finish.
 - b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
 - c. Provide hanger rod and nuts of the same type and material for a given pipe run.

- d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- 2. Clevis Hangers, Adjustable:
 - a. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
 - b. Standard-Duty: MSS SP-58 Type 1, zinc-plated.
 - c. UL (DIR) listed: Pipe sizes 2-1/2 to 8 inch.
 - d. FM (AG) listed: Pipe sizes 2-1/2 to 8 inch.
- O. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- P. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
 - 1. Manufacturers:
 - a. Anvil International: www.anvilintl.com/#sle.
 - b. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
 - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - 2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 - 3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 - 5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- Q. Pipe Shields for Insulated Piping:
 - 1. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
 - b. Shields Material: Galvanized steel.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 178 degrees F.
 - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- R. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps.
 - 7. Plastic and lead anchors are not permitted.
 - 8. Powder-actuated fasteners are not permitted.
 - 9. Hammer-driven anchors and fasteners are not permitted.
 - 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
 - d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

11. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- H. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- J. Secure fasteners according to manufacturer's recommended torque settings.
- K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 230529

**SECTION 230548
VIBRATION AND SEISMIC CONTROLS FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vibration isolation requirements.
- B. Vibration isolators.
- C. Vibration-isolated and/or seismically engineered roof curbs.
- D. In-curb sound attenuation treatment.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
- B. In-Curb Sound Attenuation Treatment: Provide acoustic test data indicating characteristics of sound absorption and transmission loss through testing in accordance with ASTM E90.

1.06 QUALITY ASSURANCE

- A. Comply with applicable building code.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

- C. General Requirements:
 - 1. Select vibration isolators to provide required static deflection.
 - 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
 - 3. Select vibration isolators for outdoor equipment to comply with wind design requirements.
- D. Equipment Isolation:
 - 1. Equipment Type: Rooftop HVAC Units.
 - a. Location: Outdoor.
 - b. Mounting: Vibration-isolated roof curb.
 - c. Isolator Type (Nonseismic Application): Restrained spring isolators.
 - d. Isolator Static Deflection: Minimum, 0.75 inches.

2.02 VIBRATION ISOLATORS

- A. Manufacturers:
 - 1. Vibration Isolators:
 - a. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
 - b. Mason Industries: www.mason-ind.com/#sle.
 - c. Vibration Eliminator Company, Inc: www.veco-nyc.com/#sle.
 - d. Vibro-Acoustics: www.vibro-acoustics.com/#sle.
 - 2. Source Limitations: Furnish vibration-isolators and associated accessories produced by a single manufacturer and obtained from a single supplier.
- B. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
 - 2. Spring Elements for Spring Isolators:
 - a. Color code or otherwise identify springs to indicate load capacity.
 - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
 - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
 - d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
 - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
 - f. Selected to function without undue stress or overloading.
- C. Vibration Isolators for Nonseismic Applications:
 - 1. Resilient Material Isolator Pads:
 - a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) isolator material.
 - b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
 - c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
 - 2. Restrained Spring Isolators, Nonseismic:
 - a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
 - b. Bottom Load Plate: Steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
 - c. Furnished with integral leveling device for positioning and securing supported equipment.
 - d. Provides constant free and operating height.

2.03 VIBRATION-ISOLATED AND/OR SEISMICALLY ENGINEERED ROOF CURBS

- A. Manufacturers:

1. Vibration-Isolated and/or Seismically Engineered Roof Curbs:
 - a. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
 - b. Mason Industries: www.mason-ind.com/#sle.
 - c. Vibration Eliminator Company, Inc: www.veco-nyc.com/#sle.
 - d. Vibro-Acoustics: www.vibro-acoustics.com/#sle.
 2. Source Limitations: Furnish vibration-isolated roof curbs and associated accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.
- B. Vibration Isolation Curbs:
1. Nonseismic Curb:
 - a. Location: Between structure and rooftop equipment.
 - b. Construction: Aluminum.
 - c. Integral vibration isolation to comply with requirements of this section.
 - d. Weather exposed components consist of corrosion resistant materials.

2.04 IN-CURB SOUND ATTENUATION TREATMENT

- A. Description: Prefabricated composite acoustical panels for installation in equipment curb. Designed to attenuate sound transfer from mechanical equipment into spaces below curb.
- B. Sound Transmission Class: Not less than 37 when tested in accordance with ASTM E90.
- C. Outdoor-Indoor Transmission Class: Not less than 29 when tested in accordance with ASTM E90.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Vibration Isolation Systems:
 1. Spring Isolators:
 - a. Position equipment at operating height; provide temporary blocking as required.
 - b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
 - c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
 2. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
 3. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
 4. Adjust isolators to be free of isolation short circuits during normal operation.
 5. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.03 FIELD QUALITY CONTROL

- A. Inspect vibration isolation and/or seismic control components for damage and defects.

- B. Vibration Isolation Systems:
 - 1. Verify isolator static deflections.
 - 2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
- C. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION 230548

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Pipe markers.
- E. Ceiling tacks.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Air Terminal Units: Tags.
- C. Automatic Controls: Tags. Key to control schematic.
- D. Control Panels: Nameplates.
- E. Dampers: Ceiling tacks, where located above lay-in ceiling.
- F. Ductwork: Nameplates.
- G. Heat Transfer Equipment: Nameplates.
- H. Instrumentation: Tags.
- I. Major Control Components: Nameplates.
- J. Piping: Pipe markers.
- K. Pumps: Nameplates.
- L. Small-sized Equipment: Tags.
- M. Tanks: Nameplates.
- N. Valves: Tags and ceiling tacks where located above lay-in ceiling.
- O. Water Treatment Devices: Nameplates.

2.02 NAMEPLATES

- A. Letter Color: White.
- B. Letter Height: 1/4 inch.
- C. Background Color: Black.
- D. Nameplate Material: Material shall be suitable for environment where installed (i.e., corrosive, outdoors, etc.). Material shall allow for nameplate to be applied to curved surface, as applicable. Adhesive shall be suitable for surface where applied.

1. Flexible: Polyester with adhesive backing per ASTM D709.
2. Metal: Aluminum or stainless steel with adhesive backing and a hole per corner for screw fastening.

2.03 TAGS

- A. Metal Tags: Aluminum or stainless steel with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 ADHESIVE-BACKED DUCT MARKERS

- A. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.
- B. Style: Individual Label.
- C. Color: Green/White.

2.05 PIPE MARKERS

- A. Color: Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright-colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.
- E. Color code as follows:
 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

2.06 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.
- B. Color code as follows:
 1. HVAC Equipment: Yellow.
 2. Fire Dampers and Smoke Dampers: Red.
 3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
 1. Identify service, flow direction, and pressure.
 2. Install in clear view and align with axis of piping.

3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 230553

**SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2024, with Errata (2025).
- C. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2023.

1.03 SUBMITTALS

- A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 2. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Identification and types of measurement instruments to be used and their most recent calibration date.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Units of Measure: Report data in I-P (inch-pound) units only.
 - 6. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Architect.
 - g. Project Engineer.
 - h. Project Contractor.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.

3. Contract interpretation requests.
 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
 - C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
 - D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
 - E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
 - F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- K. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.06 SCOPE

- A. Test, adjust, and balance the following:
 1. Packaged Roof Top Heating/Cooling Units.
 2. Fans.
 3. Air Terminal Units.
 4. Air Inlets and Outlets.

3.07 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 1. Manufacturer.
 2. Model/Frame.
 3. HP/BHP.

4. Phase, voltage, amperage; nameplate, actual, no load.
 5. RPM.
 6. Service factor.
 7. Starter size, rating, heater elements.
- B. Combustion Equipment:
1. Gas pressure at meter outlet.
 2. Heat input.
 3. Burner manifold gas pressure.
 4. Heat output.
- C. Air Cooled Condensers:
1. Identification/number.
 2. Location.
 3. Manufacturer.
 4. Model number.
 5. Serial number.
 6. Entering DB air temperature, design and actual.
 7. Leaving DB air temperature, design and actual.
 8. Number of compressors.
- D. Cooling Coils:
1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Entering air DB temperature, design and actual.
 7. Entering air WB temperature, design and actual.
 8. Leaving air DB temperature, design and actual.
 9. Leaving air WB temperature, design and actual.
- E. Heating Coils:
1. Identification/number.
 2. Location.
 3. Service.
 4. Air flow, design and actual.
 5. Entering air temperature, design and actual.
 6. Leaving air temperature, design and actual.
- F. Roof Top Unit Return Air/Outside Air:
1. Identification/location.
 2. Design return air flow.
 - a. At 50% supply air flow.
 - b. At 67% supply air flow.
 - c. At 100% supply air flow.
 3. Actual return air flow.
 - a. At 50% supply air flow.
 - b. At 67% supply air flow.
 - c. At 100% supply air flow.
 4. Design outside air flow.
 - a. At 50% supply air flow. At 67% supply air flow. At 100% supply air flow.
 - b. At 67% supply air flow.
 - c. At 100% supply air flow.
 5. Actual outside air flow.
 - a. At 50% supply air flow.

- b. At 67% supply air flow.
 - c. At 100% supply air flow.
- G. Exhaust Fans:
- 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Air flow, specified and actual.
 - 6. Total static pressure (total external), specified and actual.
 - 7. Sheave Make/Size/Bore.
 - 8. Number of Belts/Make/Size.
 - 9. Fan RPM.
- H. Duct Traverses:
- 1. System zone/branch.
 - 2. Duct size.
 - 3. Area.
 - 4. Design velocity.
 - 5. Design air flow.
 - 6. Test velocity.
 - 7. Test air flow.
 - 8. Duct static pressure.
 - 9. Air temperature.
 - 10. Air correction factor.
- I. Terminal Unit Data:
- 1. Manufacturer.
 - 2. Identification/number.
 - 3. Model number.
 - 4. Size.
 - 5. Electric heat: phase, voltage, amperage.
 - 6. Electric heat: test voltage (each phase) and test amperage (each phase).
 - 7. Electric heat: input (kW).
 - 8. Electric heat discharge temperature at heating design air flow.
 - 9. Minimum static pressure.
 - 10. Minimum design air flow.
 - 11. Maximum design air flow.
 - 12. Maximum actual air flow.
 - 13. Heating design air flow.
 - 14. Heating actual airflow.
 - 15. Inlet static pressure.
- J. Air Distribution Tests:
- 1. Air terminal number.
 - 2. Room number/location.
 - 3. Terminal type.
 - 4. Terminal size.
 - 5. Design air flow.
 - 6. Test (final) air flow.
 - 7. Percent of design air flow.

END OF SECTION 230593

SECTION 230713 DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Jacketing and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2024.
- C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- E. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation; 2021.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- I. SAE AMS3779 - Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant, Aluminum Coated Glass Cloth; 2016b.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville: www.jm.com/#sle.
 - 3. Owens Corning Corporation: www.owenscorning.com/en-us/#sle.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 250 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure-sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.
- E. Indoor Vapor Barrier Mastic:
 - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, white color.
- F. Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

2.03 JACKETING AND ACCESSORIES

- A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire-retardant lagging adhesive.
 - 1. Lagging Adhesive:
 - a. Compatible with insulation.
- B. Reinforced Tape:
 - 1. FSK tape suitable for sealing seams between insulation, insulated elbows, and fittings resulting in a tight, smooth surface without wrinkles.
 - 2. Comply with UL 723 or ASTM E84.
 - 3. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
 - 4. Finish: Match insulation.

2.04 DUCT LINER

- A. Manufacturers:
 - 1. Armacell LLC: www.armacell.us/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
 - 3. Johns Manville: www.jm.com/#sle.
 - 4. Owens Corning Corporation: www.owenscorning.com/en-us/#sle.
- B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
 - 1. Fungal Resistance: No growth when tested according to ASTM G21.
 - 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 - 3. Service Temperature: Up to 250 degrees F.
 - 4. Rated Velocity on Coated Air Side for Air Erosion: 6,000 fpm, minimum.

- 5. Minimum Noise Reduction Coefficients:
 - a. 1 inch Thickness: 0.45.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, impact applied or welded with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Ducts Conveying Air Below Ambient Temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- E. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- F. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 90 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 3. Seal and smooth joints. Seal and coat transverse joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Exhaust Ducts Within 10 ft of Exterior Openings:
 - 1. Type: External Flexible Glass Fiber
 - 2. Density: 0.75 pounds per cubic foot
 - 3. Labeled Thickness: 2-1/5 inch
 - 4. Installed R-Value: R-6
- B. Outside Air Intake Ducts Within 10 ft of Exterior Openings:
 - 1. Type: External Flexible Glass Fiber
 - 2. Density: 0.75 pounds per cubic foot
 - 3. Labeled Thickness: 2-1/5 inch
 - 4. Installed R-Value: R-6
- C. Supply Ducts:
 - 1. Type: External Flexible Glass Fiber
 - 2. Density: 0.75 pounds per cubic foot

3. Labeled Thickness: 2-1/5 inch
 4. Installed R-Value: R-6
- D. Return Ducts:
1. Type: External Flexible Glass Fiber
 2. Density: 0.75 pounds per cubic foot
 3. Labeled Thickness: 2-1/5 inch
 4. Installed R-Value: R-6
- E. Transfer Ducts:
1. Type: Internal Glass Fiber
 2. Density: 1.5 pounds per cubic foot
 3. Labeled Thickness: 1 inch
 4. Installed R-Value: R-4.2

END OF SECTION 230713

**SECTION 230913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-, Surface-, and Duct-Mounted Sensors:
 - 1. Temperature sensors.
 - 2. Humidity sensors.
 - 3. Nitrogen dioxide sensors.
 - 4. Carbon monoxide sensors.
- B. Fan and pump motor run-status monitoring.

1.02 REFERENCE STANDARDS

- A. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 1989 (Corrigendum 2019).

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 WALL-, SURFACE-, AND DUCT-MOUNT SENSORS

- A. Temperature Sensors:
 - 1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
 - 2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
 - 3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
 - 4. Temperature Sensing Device: Compatible with project DDC controllers.
 - 5. Performance Characteristics:
 - a. RTD:
 - 1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
 - 2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
 - 3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
 - 4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
 - 5) Range: Minus 40 degrees F through 220 degrees F minimum.
 - b. Thermistor:
 - 1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
 - 2) Range: Minus 25 degrees F through 122 degrees F minimum.
 - 3) Heat Dissipation Constant: 2.7 mW per degree C.
 - c. Temperature Transmitter:
 - 1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
 - 2) Output: 4 to 20 mA.
 - d. Sensing Range:

- 1) Provide limited range sensors if required to sense the range expected for a respective point.
 - 2) Use RTD type sensors for extended ranges beyond minus 30 to 230 degrees F.
 - 3) Use temperature transmitters in conjunction with RTDs when RTDs are incompatible with DDC controller direct temperature input.
- e. Wire Resistance:
- 1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
 - 2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
- f. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
- g. Room Temperature Sensors with Integral Digital Display:
- 1) Construct for surface or wall box.
 - 2) Provide a four button keypad with the following capabilities:
 - (a) Indication of space and outdoor temperatures.
 - (b) Setpoint adjustment to accommodate room setpoint.
 - (c) Display and control fan operation status.
 - (d) Manual occupancy override and indication of occupancy status.
 - (e) Controller mode status.
 - (f) Password enabled setpoint and override modes.
- h. Temperature Averaging Elements:
- 1) Use on duct sensors for ductwork 10 sq ft or larger.
 - 2) Use averaging elements where prone to stratification with sensor length 8 ft or 16 ft.
 - 3) Provide for all mixed air and heating coil discharge sensors regardless of duct size.
- i. Insertion Elements:
- 1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.
 - 2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.
- B. Humidity Sensors, Outdoor-Mount:
1. Digitally profiled thin-film capacitive sensor encased in a die-cast metal, weather-proof plastic or metal housing with solar shield.
 2. Measuring Scale: 0 to 100 percent RH, noncondensing, temperature compensated.
 3. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.
 4. Accuracy: Plus/minus 1 percent between 10 to 80 percent RH linear range, NIST traceable with multi-point calibration.
 5. Temperature Sensor, Combined: Platinum RTD.
 - a. Transmitter: Fitted within device-interface enclosure, calibrated.
 - b. Monitoring Range: Minus 40 to 122 degrees F, adjustable.
 - c. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.
 - d. Accuracy: Plus/minus one percent, NIST traceable. Adjustable on the transmitter end.
 6. Service Temperature: Minus 40 to 122 degrees F.
 7. Service Humidity: 0 to 100 percent RH, noncondensing.
- C. Humidity Sensors, Duct-Mounted:
1. Digitally profiled thin-film capacitive sensor probe extended from die-cast metal, weather-proof plastic or metal housing designed for duct mounting.
 2. Measuring Scale: 0 to 100 percent RH, noncondensing, temperature compensated.
 3. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.

4. Accuracy: Plus/minus 1 percent between 10 to 80 percent RH linear range, NIST traceable with multi-point calibration.
 5. Temperature Sensor, Combined: Platinum RTD.
 - a. Transmitter: Fitted within device-interface enclosure, calibrated.
 - b. Monitoring Range: Minus 40 to 122 degrees F, adjustable.
 - c. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.
 - d. Accuracy: Plus/minus one percent, NIST traceable. adjustable on the transmitter end.
 6. Service Temperature: Minus 40 to 122 degrees F
 7. Service Humidity: 0 to 100 percent RH, noncondensing.
- D. Humidity Transmitters, Surface-Mounted:
1. High impact ABS plastic housing encased, wall-mounted, humidity and temperature sensor.
 2. Humidity Sensor Type: Thin-film capacitive.
 3. Accuracy: 1 percent at rated measuring scale and capable of withstanding 95 percent relative humidity without loss of calibration.
 4. Output: Two-wire, 4 to 20 mA, 0 to 5 VDC or 0 to 10 VDC, non-loop powered, selectable.
 5. User Control Interface: Include button for setpoint and override control.
 6. Temperature Sensor, Combined: Thermistor 10-kOhm (coordinate type with controller requirements).
 - a. Transmitter: Fitted within device-interface enclosure, calibrated.
 - b. Monitoring Range: 32 to 122 degrees F, adjustable.
 - c. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.
 - d. Accuracy: Plus/minus one percent, NIST traceable. adjustable on the transmitter end.
- E. Nitrogen Dioxide Sensors:
1. Gas sensing module that holds fixed or replaceable nitrogen dioxide gas-sensor cartridge.
 2. Form Factor: IEC 60529, IP20 enclosure, single-gang electrical box mounted.
 3. Electromechanical sensor with 0 to 15 ppm measurement range.
 4. Accuracy: Plus/minus Five percent of range with 0.1 ppm resolution.
 5. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.
 6. Alarm: Auxiliary dry contact relay driven by setpoint adjustable between 0.5 to 180 ppm.
 7. Service Temperature: Minus 4 to 122 degrees F.
 8. Service Humidity: 0 to 90 percent RH, noncondensing.
- F. Carbon Monoxide Sensors:
1. Gas sensing module that holds fixed or replaceable carbon monoxide gas-sensor cartridge.
 2. Form Factor: IEC 60529, IP20 enclosure, single-gang electrical box mounted.
 3. Electromechanical sensor with 0 to 500 ppm measurement range.
 4. Accuracy: Plus/minus Five percent of range with 1 ppm resolution.
 5. Hardwired Output: Two-wire, 4 to 20 mA, loop powered.
 6. Alarm: Auxiliary dry contact relay driven by setpoint adjustable between 25 to 180 ppm.

2.03 FAN AND PUMP MOTOR RUN-STATUS MONITORING

- A. Current Switches:
1. Solid Core: 2-state, On/Off digital output of motor status with adjustable trip point to detect belt loss or mechanical failure.
 2. Maximum AC Current Monitoring Value: 175 percent of rated motor current.
- B. Differential Pressure Switches:
1. Fan Status: Select for adjustable range between 0 to 5 in-wc across fan discharge and external or fan inlet. Include static pressure tips.

2. Pump Status: Select for adjustable range between 8 to 60 psi across pump discharge and suction sides. Include static pressure taps and 3-way valve manifold.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of exposed control sensors with plans and room details before installation. Locate 48 inches above floor. Align with lighting switches and humidistats.
- C. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.
- D. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

END OF SECTION 230913

**SECTION 233100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ducts.
- B. Flexible ducts.
- C. Ducts for kitchen exhaust applications.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 230130.51 - HVAC Air-Distribution System Cleaning: Post install duct cleaning.
- C. Section 230713 - Duct Insulation: External insulation and duct liner.
- D. Section 233300 - Air Duct Accessories.
- E. Section 233600 - Air Terminal Units.
- F. Section 233700 - Air Outlets and Inlets: Fabric air distribution devices.

1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- E. ASTM E2336 - Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems; 2020.
- F. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).
- G. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
- H. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
- I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- J. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- K. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- L. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- M. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.
- N. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.
- O. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.
- P. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide data for duct materials, duct liner, and duct connections.
- B. Shop Drawings: Indicate duct fitting types, gauges, sizes, welds, and configuration for kitchen hood exhaust and vehicle exhaust systems.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.06 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
- B. Provide metal duct unless otherwise indicated.
- C. Acoustical Treatment: Provide sound-absorbing liners where indicated.
- D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
 - 1. Round: Plus or minus 2 in-wc of galvanized steel.
 - 2. Rectangular: Plus or minus 3 in-wc of galvanized steel.
 - 3. Flexible Duct (Fabric and wire): Plus or minus 2 in-wc; see Section 233700.
- E. Duct Sealing and Leakage in accordance with Static Pressure Class:
 - 1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
 - a. Supply Air: 3 in-wc pressure class, galvanized steel.
 - b. Outside Air Intake: 1 in-wc pressure class, galvanized steel.
 - c. Return and Relief Air: 1 in-wc pressure class, galvanized steel.
 - d. General Exhaust Air: 1 in-wc pressure class, galvanized steel.
 - e. Transfer-air and Sound Booths: 1/2 in-wc pressure class, galvanized steel.
 - 2. Low Pressure Service: Up to 2 in-wc:
 - a. Seal: Class C, apply to seal off transverse joints.
 - b. Leakage:
 - 1) Rectangular: Class 24 or 24 cfm/100 sq ft.
 - 2) Round: Class 12 or 12 cfm/100 sq ft.
 - 3. Low Pressure Service: From 2 in-wc to 3 in-wc:
 - a. Seal: Class B, apply sealing of transverse joints and longitudinal seams.
 - b. Leakage:
 - 1) Rectangular: Class 12 or 12 cfm/100 sq ft.
 - 2) Round: Class 6 or 6 cfm/100 sq ft.
 - 4. Medium and High Pressure Service: Above 3 in-wc:
 - a. Seal: Class A, apply sealing of transverse joints, longitudinal seams, and duct wall penetrations.
 - b. Leakage:
 - 1) Round: Class 3 or 3 cfm/100 sq ft.
- F. Duct Fabrication Requirements:
 - 1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
 - 2. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

3. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
4. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.
5. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
6. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
7. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
8. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide transition from wall louver dimensions to duct outlet dimension(s).

2.02 METAL DUCTS

- A. Material Requirements:
 1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Rectangular Metal Duct:
 1. Rectangular Single Wall: Rectangular, longitudinal lock seam duct with galvanized steel wall.
- C. Round Metal Ducts:
 1. Round Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).
- D. Round Spiral Duct:
 1. Round spiral lock seam duct with galvanized steel outer wall.
- E. Connectors, Fittings, Sealants, and Miscellaneous:
 1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
 2. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - b. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - c. For Use with Flexible Ducts: UL labeled.
 3. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
 4. Hanger Fasteners: Attach hangers to structure using appropriate fasteners as follows:
 - a. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - b. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - c. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - d. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - e. Other Types: As required.

2.03 FLEXIBLE DUCTS

- A. Vapor Barrier Insulated Flexible Air Ducts:
 1. UL 181, Class 1, two-ply polyester film supported by helically wound spring steel wire.
 2. Insulation: Fiberglass insulation with polyethylene vapor barrier core.
 3. Pressure Rating: From 10 in-wc positive to 1 in-wc negative.
 4. Maximum Velocity: 4,000 fpm.
 5. Temperature Range: Minus 10 to 160 degrees F.

2.04 DUCTS FOR KITCHEN EXHAUST APPLICATIONS

- A. Provide ductwork, fittings, and appurtenances in accordance with NFPA 96, SMACNA (KVS), UL 1978, and UL 2221 requirements and guidelines.
- B. Class 1 duct for air with gas and grease particle exhaust at an air velocity of 1,500 to 2,500 fpm.
- C. Ducts shall be self-draining back to equipment.
- D. Design, fabricate, and install liquidtight preventing exhaust leakage into building.
- E. Kitchen Hood and Grease Exhaust Duct:
 - 1. Fabricate in accordance with ductwork manufacturer's instructions, SMACNA (DCS), SMACNA (KVS), and NFPA 96.
 - 2. Round, Double-Wall, Premanufactured Grease Exhaust Ducts:
 - a. UL Listed and labeled to UL 1978.
 - b. Nominal 2 inches thick, body soluble fiber insulation that fills annular space between inner liner of 20-gauge, 0.035 inch Type 304 stainless steel and outer jacket of 24-gauge, 0.023-inch aluminized steel.
 - c. Seal joints during installation with factory-supplied overlapping V-bands and sealant.
 - d. Minimum horizontal slope of 1/16 inch per foot per manufacturer's listing to UL 1978.
 - 3. Grease Exhaust Duct Access Doors:
 - a. Listed when tested in accordance with UL 1978.
 - b. Provide with preinsulated door to comply with ASTM E2336.
 - c. Install hinged access doors where indicated or required for access for cleaning and inspection of duct.
 - d. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install products following the manufacturer's instructions.
- C. Comply with safety standards NFPA 90A and NFPA 90B.
- D. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Flexible Ducts: Connect to metal ducts with draw bands.
- G. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- H. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.
- I. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- J. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.
- K. Use double nuts and lock washers on threaded rod supports.
- L. Connect diffusers or light troffer boots to low-pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

- M. Set plenum doors at 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.
- N. At exterior wall louvers, seal duct to louver frame.
- O. Fire Partitions: Provide firestopping sealing. See Section 078400.
- P. Duct Accessories, Terminal Units, Inlets, and Outlets: Interconnect as indicated in Sections 233300, 233600, and 233700.
- Q. Duct Insulation: Provide duct insulation. See Section 230713.

3.02 CLEANING

- A. Clean thoroughly each duct system. See Section 230130.51.
- B. Clean duct system by forcing air at high velocity through duct to remove accumulated dust. Clean half the system at a time to obtain sufficient air. Protect equipment that could be harmed by excessive dirt with temporary filters or bypass during cleaning.

END OF SECTION 233100

**SECTION 233300
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backdraft dampers - metal.
- B. Duct access doors.
- C. Duct test holes.
- D. Fire dampers.
- E. Flexible duct connectors.
- F. Volume control dampers.
- G. Miscellaneous Products:
 - 1. Duct opening closure film.

1.02 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide for shop-fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements for additional provisions.
 - 2. Extra Fusible Links: One of each type and size.

1.04 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

- A. Manufacturers:
 - 1. Greenheck: www.greenheck.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.
- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.02 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Greenheck: www.greenheck.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.

- B. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick-fastening locking devices. For insulated ducts, install minimum 1-inch thick insulation with sheet metal cover.
 - 1. Less Than 12 inches Square: Secure with sash locks.
 - 2. Up to 18 inches Square: Provide two hinges and two sash locks.
 - 3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
 - 4. Larger Sizes: Provide an additional hinge.
- C. Access doors with sheet metal screw fasteners are not acceptable.

2.03 DUCT TEST HOLES

- A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.04 FIRE DAMPERS

- A. Manufacturers:
 - 1. Greenheck: www.greenheck.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.
- B. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations or closure under air flow conditions. Configure with blades out of air stream. Provide with integral sleeve by the fire damper manufacturer.
- C. Fusible Links: UL 33, separate at 165 degrees F with adjustable link straps for combination fire/balancing dampers.

2.05 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz/sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.
- C. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.
- D. Maximum Installed Length: 14 inch.

2.06 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Greenheck: www.greenheck.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers:
 - 1. Blade: 24 gauge, 0.0239 inch, minimum.
- D. Multi-Blade Damper: Fabricate consisting of opposed blades with maximum blade sizes 8 by 72 inches. Assemble center- and edge-crimped blades in prime-coated or galvanized-channel frame with suitable hardware.
 - 1. Blade: 18 gauge, 0.0478 inch, minimum.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

- F. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.07 MISCELLANEOUS PRODUCTS

- A. Damper Operators: Provide manual and electric operators; see Section 253513.
- B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 - 1. Thickness: 2 mils.
 - 2. High tack water based adhesive.
 - 3. UV stable light blue color.
 - 4. Elongation Before Break: 325 percent, minimum.
- C. Residential Dryer Exhaust Receptacle: Formed aluminized-steel in-wall receptacle to house flexible transition duct; seamless interior, rounded corners; integral nailing flanges. Match depth of box to depth of stud cavity.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 233100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 by 8 inch size access door for hand and shoulder access, or as indicated on drawings. Provide minimum 4 by 4 inch size access door for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire-rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Demonstrate re-setting of fire dampers to Owner's representative.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.
- J. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum two duct widths from duct take-off.
- K. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION 233300

**SECTION 233423
HVAC POWER VENTILATORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof exhausters.
- B. Ceiling exhaust fans.
- C. Kitchen hood upblast roof exhausters.

1.02 RELATED REQUIREMENTS

- A. Section 233300 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
- B. AMCA 99 - Standards Handbook; 2025.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2025.
- E. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.
- G. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- I. UL 705 - Power Ventilators; Current Edition, Including All Revisions.
- J. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate fan roof curbs and service utilities installation according to fan size.
- B. Sequencing: Ensure that utility connections are completed in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. Product Data: Provide data on fans and accessories, including fan curves with specified operating point plotted, power, rpm, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck Fan Corporation: www.greenheck.com/#sle.
- B. Loren Cook Company: www.lorencook.com/#sle.
- C. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.
- D. Twin City Fan & Blower: www.tcf.com/#sle.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: Comply with AMCA 204.
- B. Performance Ratings: Comply with AMCA 210, bearing certified rating seal.

- C. Sound Ratings: Comply with AMCA 301, tested to AMCA 300, bearing certified sound ratings seal.
- D. Fabrication: Comply with AMCA 99.
- E. UL Compliance: UL 705, listed, labeled, designed, manufactured, and tested.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- G. Kitchen Hood Exhaust Fans: Comply with requirements of NFPA 96 and UL 762.

2.03 ROOF EXHAUSTERS

- A. Fan Unit: Direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
- B. Roof Curb: 12 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips and factory installed nailer strip.
- C. Disconnect Switch: Factory wired, nonfusible, in housing for thermal overload protected motor.
- D. Hand/Off/Auto (HOA) controller.
- E. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked.
- F. Performance Ratings: As indicated on drawings.

2.04 CEILING EXHAUST FANS

- A. Centrifugal Fan Unit: Direct driven with galvanized steel housing lined with acoustic insulation, resiliently mounted motor, gravity backdraft damper in discharge.
- B. Disconnect Switch: Cord and plug-in housing for thermal overload protected motor and wall mounted switch.
- C. Grille: Aluminum with baked white enamel finish.
- D. Performance Ratings: As indicated on drawings.

2.05 KITCHEN HOOD UPBLAST ROOF EXHAUSTERS

- A. Belt Drive Fan:
 - 1. Fan Wheel:
 - a. Type: Non-overloading, backward inclined centrifugal.
 - b. Material: Aluminum, statically and dynamically balanced.
 - 2. Housing:
 - a. Construct of heavy gauge aluminum including curb cap, windband, and motor compartment.
 - b. Rigid internal support structure.
 - c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
 - d. Construct drive frame assembly of heavy gauge steel, mounted on vibration isolators.
 - e. Provide breather tube for fresh air motor cooling and wiring.
- B. Shafts and Bearings:
 - 1. Fan Shaft:
 - a. Ground and polished steel with anti-corrosive coating.
 - b. First critical speed at least 25 percent over maximum cataloged operating speed.
 - 2. Bearings:
 - a. Permanently sealed or pillow block type.
 - b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
 - c. 100 percent factory tested.

- C. Drive Assembly:
 - 1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
 - 2. Belts: Static free and oil resistant.
 - 3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
 - 4. Motor pulley adjustable for final system balancing.
 - 5. Readily accessible for maintenance.
- D. Disconnect Switches:
 - 1. Factory mounted and wired.
 - 2. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Outdoor Locations: Type 3R.
 - 3. Finish for Painted Steel Enclosures: Provide manufacturer's standard or factory-applied gray unless otherwise indicated.
 - 4. Positive electrical shutoff.
 - 5. Wired from fan motor to junction box installed within motor compartment.
- E. Roof Curb: 24 inch high self-flashing of galvanized steel with continuously welded seams, ventilated double wall.
- F. Drain Trough: Allows for single-point drainage of water, grease, and other residues.
- G. Options/Accessories:
 - 1. Roof Curb Extension: Vented curb extension where required for compliance with minimum clearances required by NFPA 96.
 - 2. Drain Connection:
 - a. Aluminum construction.
 - 3. Hinge Kit:
 - a. Aluminum hinges.
 - b. Hinges and restraint cables mounted to base sleeve.
 - c. Allows fan to tilt away for access to wheel and ductwork for inspection and cleaning.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with stainless steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- D. Provide sheaves required for final air balance.
- E. Install backdraft dampers on inlet to roof and wall exhausters.
- F. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

END OF SECTION 233423

**SECTION 233439
HIGH-VOLUME, LOW-SPEED PROPELLER FANS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High-volume, low-speed propeller fans.

1.02 REFERENCE STANDARDS

- A. AMCA 99 - Standards Handbook; 2025.
- B. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- C. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 1989 (Corrigendum 2019).
- D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- E. UL 507 - Electric Fans; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

- A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- B. Manufacturer's Instructions: Indicate installation instructions.
- C. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 507.
- B. Static and Dynamically Balanced: Comply with AMCA 204.
- C. Fabrication: Comply with AMCA 99.
- D. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- E. Enclosed Safety Switches: Comply with NEMA EN 10250.

2.02 HIGH-VOLUME, LOW-SPEED PROPELLER FANS

- A. Manufacturers:
 - 1. Big Ass Fans: www.bigassfans.com/#sle.
 - 2. Greenheck: www.greenheck.com/#sle.
- B. Performance Ratings: As scheduled.
- C. Mounting Options: Structure.
- D. Direct Drive Fan:
 - 1. Statically and dynamically balanced.
 - 2. Motors:
 - a. Open drip-proof (ODP).
 - b. Heavy duty ball bearing type.

- c. Mount on vibration isolators or resilient cradle mounts, out-of-airstream.
 - d. Fully accessible for maintenance.
- E. Shafts and Bearings:
 - 1. Fan Shaft:
 - a. Ground and polished steel with anti-corrosive coating.
 - b. First critical speed at least 25 percent over maximum cataloged operating speed.
 - 2. Bearings:
 - a. Permanently sealed or pillow block type.
 - b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
 - c. 100 percent factory tested.
- F. Disconnect Switches:
 - 1. Factory mounted and wired.
 - 2. NEMA EN 10250 Enclosure: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - 3. Finish for Painted Steel Enclosures: Provide manufacturer's standard unless otherwise indicated.
 - 4. Positive electrical shutoff.
 - 5. Wired from fan motor to junction box installed within motor compartment.
- G. Fan Controllers:
 - 1. Shipped loose for field mounting.
 - 2. Single Yoke Controllers:
 - a. Control fan direction and speed.
 - b. Provide wall-mounted, IP66 enclosure rating in accordance with IEC 60529.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure fan with stainless steel lag screws to structure.

END OF SECTION 233439

**SECTION 233600
AIR TERMINAL UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-duct terminal units.

1.02 RELATED REQUIREMENTS

- A. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).
- B. AHRI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets; 2008, with Addendum (2011).
- C. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2024.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing: Completion utility connections in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate airflow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 WARRANTY

- A. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.01 SINGLE-DUCT, VARIABLE-VOLUME UNITS

- A. Manufacturers:
 - 1. Daikin Applied: www.daikinapplied.com/#sle.
 - 2. Nailor Industries: www.nailor.com/#sle.
 - 3. Price Industries: www.priceindustries.com/#sle.
 - 4. Titus: www.titus-hvac.com/#sle.
- B. Acoustic Performance Requirements:
 - 1. Sound ratings of air distribution assemblies: Not to exceed 30 NC at a 0.75 static pressure drop across the unit, and the downstream static pressure of 0.25.
 - 2. Use attenuation values found in appendix E of AHRI 885.
- C. General:

1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
 2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
- D. Unit Casing:
1. Minimum 22 gauge, 0.0299 inch galvanized steel.
 2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
 3. Unit Discharge: Rectangular, with slip-and-drive connections.
 4. Acceptable Liners:
 - a. 1 inch thick, coated, fibrous-glass complying with ASTM C1071.
 - 1) Secure with adhesive.
 - 2) Coat edges exposed to airstream with NFPA 90A approved sealant.
 - 3) Cover liner with non-porous foil.
 - b. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.
- E. Sound Attenuator:
1. Provide if required to meet scheduled acoustical performance requirements.
 2. Construction to consist of a continuous extension of the casing and liner as required to achieve required attenuation.
 3. At 2000 fpm inlet velocity, the minimum operating pressure with attenuator added not to exceed 0.14 in-wc.
- F. Damper Assembly:
1. Heavy-gauge, galvanized steel, or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
 2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
 3. Incorporate low leak damper blades for tight airflow shutoff.
- G. Electric Heating Coil:
1. Listed and provided by the terminal unit manufacturer.
 2. Coil Casing: 20 gauge, 0.0359 inch galvanized steel.
 3. Heating Elements: Nickel chrome, supported by ceramic insulators.
 4. Integral Control Panel: NEMA EN 10250, Type 2 enclosure with hinged access door for access to all controls and safety devices.
 5. Furnish a primary automatic reset thermal cutout and differential pressure airflow switch for proof of airflow.
 6. Provide the following additional components, mounted and/or wired within the control enclosure:
 - a. Fused or non-fused door interlocking disconnect switch.
 - b. Mercury contactors.
 - c. Fuse block.
 7. Factory wired, including all limit switches and steps of control as indicated on the equipment schedule, with the SSR (solid-state relay) proportional heat control.
 8. Provide SCR (Silicon Controlled Rectifier) controller.
- H. Electrical Requirements:
1. Single-point power connection.
 2. Equipment wiring to comply with requirements of NFPA 70.
- I. Control Transformers: Factory supplied and mounted for electric and electronic control applications.
- J. Controls:

1. Terminal Unit Controls:
 - a. Provide DDC controller including airflow sensor, duct-mounted temperature sensor, and damper and damper actuator.
 - b. Factory ship DDC controller including airflow sensor and damper and damper actuator to terminal unit manufacturer for factory installation.
 - c. Sequence of Operation: Zone temperature control with airflow and coil discharge monitoring.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.
- C. Provide ceiling access doors or locate units above easily removable ceiling components.
- D. Support units individually from structure in accordance with SMACNA (SRM), as required.
- E. Provide units with hanger brackets, all thread rod, and beam clamps. Fan powered units shall be provided with vibration isolation hangers.
- F. Do not support from ductwork.
- G. Connect to ductwork in accordance with Section 233100.
- H. Verify that electric power is available and of the correct characteristics.

3.02 ADJUSTING

- A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to 30 percent full flow. Set units with heating coils for minimum 50 percent full flow.

3.03 CLEANING

- A. Vacuum clean coils and inside of units.
- B. Install new filters.

END OF SECTION 233600

**SECTION 233700
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
- B. Rectangular ceiling diffusers.
- C. Registers/grilles:
 - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
 - 2. Ceiling-mounted, exhaust and return register/grilles.
 - 3. Ceiling-mounted, supply register/grilles.
 - 4. Wall-mounted, supply register/grilles.
 - 5. Wall-mounted, exhaust and return register/grilles.
- D. Louvers:
 - 1. Combination louvers.

1.02 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.
- C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Krueger-HVAC: www.krueger-hvac.com/#sle.
- B. Metalaire, a brand of Metal Industries Inc: www.metalaire.com/#sle.
- C. Price Industries: www.priceindustries.com/#sle.
- D. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square formed adjustable, backpan stamped, and core removable ceiling diffusers constructed to maintain 360 degree discharge air pattern with sectorizing baffles where indicated.
- B. Connections: Round.
- C. Frame: Provide surface mount and inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Aluminum with baked enamel finish.
- E. Color: As selected by Architect from manufacturer's full range.
- F. Accessories: Provide volume control damper—where required; removable core and sectorizing baffle—where required—with damper adjustable from diffuser face.

2.03 CEILING SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.
- B. Frame: 1-1/4 inch margin with concealed mounting and gasket.
- C. Construction: Made of aluminum extrusions with factory enamel finish.
- D. Color: As selected by Architect from manufacturer's full range.
- E. Damper—where required: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.04 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, horizontal face.
- B. Frame: 1-1/4 inch margin with concealed mounting.
- C. Fabrication: Aluminum with 20 gauge minimum frames and 22 gauge minimum blades with factory baked enamel finish.
- D. Color: To be selected by Architect from manufacturer's full range.
- E. Damper—where required: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.05 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch grid core.
- B. Fabrication: Grid core consists of aluminum with baked enamel finish.
- C. Frame: Channel lay-in frame for suspended grid ceilings.

2.06 WALL SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, double deflection.
- B. Frame: 1-1/4 inch margin with concealed mounting and gasket.
- C. Fabrication: Aluminum with 20 gauge minimum frames and 22 gauge minimum blades with factory baked enamel finish.
- D. Color: To be selected by Architect from manufacturer's full range.
- E. Damper—as required: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.07 WALL EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.
- B. Frame: 1-1/4 inch margin with concealed mounting.
- C. Fabrication: Aluminum extrusions, with factory baked enamel finish.
- D. Color: To be selected by Architect from manufacturer's full range.
- E. Damper—as required: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.08 LOUVERS

- A. Manufacturers:
 - 1. Greenheck: www.greenheck.com/#sle.
 - 2. NCA, a brand of Metal Industries Inc: www.ncamfg.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.

- B. Type: 6 inch deep frame with drainable brades, heavy channel frame, 1/2 inch square mesh screen over intake or exhaust end.
- C. Fabrication: 16 gauge, 0.0598 inch (1.52 mm) thick galvanized steel thick galvanized steel welded assembly, with factory baked enamel finish.
- D. Color: To be selected by Architect from manufacturer's full range.
- E. Mounting: Furnish with exterior flat flange for installation.

2.09 COMBINATION LOUVERS

- A. Damper-combined, drainable louver:
- B. Size: As indicated on the drawings.
- C. Material: Extruded galvanized steel.
- D. Paint Finish and Color: To be selected by Architect from manufacturer's full range.
- E. Sleeve or Flange: Factory-mounted standard.
- F. Linkage: Extended.
- G. Custom Features: Include bird screen, clip angles, and flanged frame.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with air tight connection.
- E. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.

3.02 PROTECTION

- A. Protect installed products until completion of project.
- B. Replace, repair, or touch-up damaged products before Substantial Completion.

END OF SECTION 233700

**SECTION 237416
PACKAGED ROOFTOP AIR-CONDITIONING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged, small-capacity, rooftop air-conditioning units.

1.02 RELATED REQUIREMENTS

- A. Section 230548 - Vibration and Seismic Controls for HVAC.
- B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

1.04 SUBMITTALS

- A. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Filters: One set for each unit.

1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from physical damage by storing off site until roof mounting curbs are in place and ready for immediate installation of units.

1.07 WARRANTY

- A. Provide a five year parts warranty to include coverage for refrigeration compressors.
- B. Provide fifteen year parts warranty to include coverage for gas heat exchanger.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aaon: www.aaon.com/#sle.
- B. Carrier Corporation: www.commercial.carrier.com/#sle.
- C. Johnson Controls International, PLC: www.johnsoncontrols.com/#sle.
- D. Daikin: www.daikinapplied.com/#sle.
- E. Trane Technologies, PLC: www.trane.com/#sle.

2.02 PACKAGED, SMALL-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS

- A. General: Roof mounted units having gas burner and electric refrigeration that are 6 tons and smaller in capacity.
- B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.
- C. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) no greater than that allowed by federal code.

- D. Disconnect Switch: Factory mount disconnect switch in control panel.

2.03 CASING

- A. Cabinet: Galvanized steel with baked enamel finish, including access doors with piano hinges and locking handle. Structural members to be minimum 18 gauge, 0.0478 inch, with access doors or panels of minimum 20 gauge, 0.0359 inch.
- B. Insulation: 1-inch thick, foam with R-value of 7 (minimum). Insulation shall be provided with galvanized steel surface on side facing the airstream.

2.04 FANS

- A. Supply and Exhaust Fan: Forward curved centrifugal type, and rubber isolated hinge mounted. Provide with high efficiency direct drive motor. Isolate complete fan assembly.

2.05 BURNERS

- A. Gas Burner: Induced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame-sensing device, and automatic 100 percent shutoff pilot.
 - 1. Construction: Welded stainless steel.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after airflow proven and slight delay, allow gas valve to open.
- C. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature, and energize burner when temperature drops to lower safe value.

2.06 EVAPORATOR COIL

- A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.
- B. Provide thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.07 CONDENSER COIL

- A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
- B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.
- C. Provide refrigerant pressure switches to cycle condenser fans.

2.08 COMPRESSORS

- A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.
- B. Provide step capacity control by cycling compressors.

2.09 MIXED AIR CASING

- A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.
- B. Gaskets: Provide tight fitting dampers with edge gaskets maximum leakage 4 cfm/ft² at 1-inch pressure differential.
- C. Damper Operator: 24 volts with gear train sealed in oil.

2.10 AIR FILTERS:

- A. 2-inch thick, glass fiber disposable media in metal frames.

2.11 OPERATING CONTROLS - VARIABLE VOLUME UNITS

- A. Temperature transmitter located in supply air to signal electronic logic panel to control mixing dampers and cooling in sequence. Mixing section to operate as first stage of cooling and revert to minimum outdoor air when outdoor air enthalpy is greater than return air enthalpy.
- B. Control cooling by cycling compressors, cylinder unloading, and hot gas bypass.
- C. Control logic to allow supply air reset under low load or airflow conditions.
- D. Seven day time clock with spring carry over or electronic clock with battery backup to control unit on occupied/unoccupied schedule. Locate clock in remote control panel with status lights.
- E. Provide two stage morning warm-up thermostat to hold outdoor dampers closed and energize heat until return air temperature reaches setpoint.

2.12 ROOF CURBS

- A. Roof Mounting Curb: 18 inches high, galvanized steel, channel frame with gaskets, nailer strips, acoustically insulated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as required by manufacturer.
- B. Verify that proper power supply is available.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 90A.
- C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment. Adjust for proper operation.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstrate proper operation of equipment to Owner's designated representative.

END OF SECTION 237416

**SECTION 238200
CONVECTION HEATING AND COOLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric unit heaters.
- B. Electric cabinet unit heaters.

1.02 REFERENCE STANDARDS

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

- A. Product Data: Provide typical catalog of information including arrangements.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 ELECTRIC UNIT HEATERS

- A. Manufacturers:
 - 1. Markel: www.markel-products.com/#sle.
 - 2. Marley Engineered Products: www.marleymep.com/#sle.
 - 3. Trane Technologies, PLC: www.trane.com/#sle.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL) as suitable for purpose indicated.
- C. Heating Element Assembly:
 - 1. Thermal safety cut-out within electric terminal box with automatically reset switch located near electric terminal box.
 - 2. Horizontal Projection Units:
 - a. Steel fins copper brazed to steel sheath and epoxy sealed for moisture resistance.
- D. Housing:
 - 1. Suitable for ceiling or high altitude mount using provided hardware appendages.
 - 2. Horizontal Projection Units:
 - a. Construction materials to consist of heavy gauge steel with polyester powder coat or high gloss baked enamel finish.
 - b. Provide with threaded holes for threaded rod suspension.
 - c. Provisions for access to internal components for maintenance, adjustments, and repair.
- E. Air Inlets and Outlets:
 - 1. Inlets: Provide stamped louvers or protective grilles with fan blade guard.
 - 2. Outlets: Provide directional louvers.
- F. Fan: Factory balanced, direct drive, axial type with fan guard.
- G. Motor: Totally enclosed, thermally protected, and provided with permanently lubricated bearings.
- H. Controls:
 - 1. Remoteline-voltage thermostat.

- I. Electrical Characteristics: As scheduled.
 - 1. Disconnect Switch: Factory mount disconnect switch.

2.02 ELECTRIC CABINET UNIT HEATERS

- A. Manufacturers:
 - 1. Markel: www.markel-products.com/#sle.
 - 2. Marley Engineered Products: www.marleymep.com/#sle.
 - 3. Trane Technologies, PLC: www.trane.com/#sle.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL) as suitable for purpose indicated.
- C. Heating Elements: Provide finned tubular.
- D. Cabinet:
 - 1. Minimum 18 gauge, 0.0478 inch thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
 - 2. Provide required hardware accessories for recessed or wall mounting.
- E. Finish:
 - 1. Factory applied, polyester powder coat or high gloss baked enamel finish.
 - 2. Color: Factory standard color.
- F. Fan: Factory balanced, direct drive, axial type with fan guard connected to totally enclosed, thermally protected motor with permanently lubricated bearings, and thermal cutout switch with automatic reset to de-energize electric heating elements in the event of overheating.
- G. Controls:
 - 1. Built-in line-voltage thermostat.
- H. Filter: Easily removed, 1 inch thick glass fiber throw-away type, located to filter air before coil.
- I. Electrical Characteristics: As scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
- C. Do not damage equipment or finishes.
- D. Unit Heaters:
 - 1. Support from building structure.
- E. Cabinet Unit Heaters:
 - 1. Coordinate to ensure correct recess size for recessed units.
- F. Units with Electric Heating Elements:
 - 1. Install as indicated including electrical devices furnished by manufacturer but not factory installed.

END OF SECTION 238200

**SECTION 260510
COMMON WORK RESULTS FOR ELECTRICAL**

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements generally applicable to all electrical Work on the Project, including but not limited to Work specified in Divisions 26, 27, and 28.

1.02 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. 8P8C: An 8-position 8-contact modular jack.
2. A: Ampere, unit of electrical current.
3. AC or ac: Alternating current.
4. AFCI: Arc-fault circuit interrupter.
5. AHJ: Authority Having Jurisdiction
6. AIC: Ampere interrupting capacity.
7. AL, Al, or ALUM: Aluminum.
8. ASD: Adjustable-speed drive.
9. ATS: Automatic transfer switch.
10. AWG: American wire gauge; see ASTM B258.
11. BAS: Building automation system.
12. BIL: Basic impulse insulation level.
13. BIM: Building information modeling.
14. BMS: Building management system.
15. CAD: Computer-aided design or drafting.
16. CATV: Community antenna television.
17. CB: Circuit breaker.
18. cd: Candela, the SI fundamental unit of luminous intensity.
19. CO/ALR: Copper-aluminum, revised.
20. COPS: Critical operations power system.
21. CU or Cu: Copper.
22. CU-AL or AL-CU: Copper-aluminum.
23. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
24. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
25. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
26. dBm: Decibel absolute power with respect to 1 mW.
27. DC or dc: Direct current.
28. DCOA: Designated critical operations area.
29. DDC: Direct digital control (HVAC).
30. EGC: Equipment grounding conductor.
31. ELV: Extra-low voltage.
32. EMF: Electromotive force.
33. EMI: Electromagnetic interference.
34. EMP: Electrical maintenance program (operation and maintenance); electromagnetic pulse (transient analysis).
35. EPS: Emergency power supply.
36. EPSS: Emergency power supply system.
37. ESS: Energy storage system.
38. EV: Electric vehicle.

39. EVPE: Electric vehicle power export equipment.
40. EVSE: Electric vehicle supply equipment.
41. FACU: Fire-alarm control unit.
42. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
43. FLC: Full-load current.
44. ft: Foot.
45. ft-cd: Foot-candle, the antiquated U.S. standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" when the SI unit candela (cd) replaced the international candle; see "fc."
46. FTP: File transfer protocol.
47. GEC: Grounding electrode conductor.
48. GFCI: Ground-fault circuit interrupter.
49. GFPE: Ground-fault protection of equipment.
50. GND: Ground.
51. HACR: Heating, air conditioning, and refrigeration.
52. HDPE: High-density polyethylene.
53. HID: High-intensity discharge.
54. HP or hp: Horsepower.
55. HVAC: Heating, ventilating, and air conditioning.
56. Hz: Hertz.
57. IBT: Intersystem bonding termination.
58. ICT: Information and communications technology.
59. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
60. I/O: Input/output.
61. IP: Ingress protection rating (enclosures); Internet protocol (communications).
62. IR: Infrared.
63. IS: Intrinsically safe.
64. IT&R: Inspecting, testing, and repair.
65. ITE: Information technology equipment.
66. kAIC: Kiloampere interrupting capacity.
67. kcmil or MCM: One thousand circular mils.
68. kV: Kilovolt.
69. kVA: Kilovolt-ampere.
70. kvar: Kilovolt-ampere reactive.
71. kW: Kilowatt.
72. kWh: Kilowatt-hour.
73. LAN: Local area network.
74. lb: Pound (weight).
75. lbf: Pound (force).
76. LCD: Liquid-crystal display.
77. LCDI: Leakage-current detector-interrupter.
78. LED: Light-emitting diode.
79. Li-ion: Lithium-ion.
80. lm: Lumen, the SI-derived unit of luminous flux.
81. LNG: Liquefied natural gas.
82. LP-Gas: Liquefied petroleum gas.
83. LRC: Locked-rotor current.
84. LV: Low voltage.
85. lx: Lux, the SI-derived unit of illuminance equal to one lumen per square meter.

86. m: Meter.
87. MCC: Motor-control center.
88. MDC: Modular data center.
89. MG set: Motor-generator set.
90. MIDI: Musical instrument digital interface.
91. MLO: Main lugs only.
92. MPEG-2: Abbreviation for the ISO/IEC Moving Picture Experts Group's standard for generic coding of moving pictures and associated audio information (ISO/IEC 13818) released in 1995 and used for most over-the-air and satellite broadcast digital television.
93. MPEG-4: Abbreviation for the ISO/IEC Moving Picture Experts Group's standard framework for coding of audio-visual objects (ISO/IEC 14496) released in 1999, with digital rights management and more advanced compression algorithms than MPEG-2.
94. MOV: Metal-oxide varistor.
95. MV: Medium voltage.
96. MVA: Megavolt-ampere.
97. mW: Milliwatt.
98. MW: Megawatt.
99. MWh: Megawatt-hour.
100. N.C.: Normally closed.
101. Ni-Cd: Nickel-cadmium.
102. Ni-MH: Nickel-metal hydride.
103. NIU: Network interface unit.
104. N.O.: Normally open.
105. NPT: National (American) standard pipe taper.
106. OCPD: Overcurrent protective device.
107. ONT: Optical network terminal.
108. PC: Personal computer.
109. PCS: Power conversion system.
110. PCU: Power-conditioning unit.
111. PF or pf: Power factor.
112. PHEV: Plug-in hybrid electric vehicle.
113. PLC: Programmable logic controller.
114. PLFA: Power-limited fire alarm.
115. PoE: Power over Ethernet.
116. POTS: Plain old telephone service. See "public switched telephone network" definition.
117. PSTN: Public switched telephone network.
118. PV: Photovoltaic.
119. PVC: Polyvinyl chloride.
120. pW: Picowatt.
121. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
122. RMS or rms: Root-mean-square.
123. RPM or rpm: Revolutions per minute.
124. SCADA: Supervisory control and data acquisition.
125. SCCR: Short-circuit current rating.
126. SCR: Silicon-controlled rectifier.
127. SPD: Surge protective device.
128. sq.: Square.
129. SWD: Switching duty.
130. TCP/IP: Transmission Control Protocol/Internet Protocol.
131. TEFC: Totally enclosed fan-cooled.
132. TR: Tamper resistant.
133. TVSS: Transient voltage surge suppressor.
134. UL: (standards) UL Standards & Engagement Inc.; (product categories) UL, LLC.

135. UL CCN: UL Category Control Number.
136. UPS: Uninterruptible power supply.
137. USB: Universal serial bus.
138. UV: Ultraviolet.
139. V: Volt, unit of electromotive force.
140. V(ac): Volt, alternating current.
141. V(dc): Volt, direct current.
142. VA: Volt-ampere, unit of complex electrical power.
143. VAR: Volt-ampere reactive, unit of reactive electrical power.
144. VFC: Variable-frequency controller.
145. VOM: Volt-ohm-multimeter.
146. VoIP: Voice over Internet Protocol.
147. VPN: Virtual private network.
148. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
149. W: Watt, unit of real electrical power.
150. WAN: Wide area network.
151. Wh: Watt-hour, unit of electrical energy usage.
152. WPT: Wireless power transfer.
153. WPTE: Wireless power transfer equipment.
154. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit (thin wall).
7. EPEC-A: Type A electrical HDPE underground conduit.
8. EPEC-B: Type B electrical HDPE underground conduit.
9. ERMC: Electrical rigid metal conduit.
10. ERMC-A: Aluminum electrical rigid metal conduit.
11. ERMC-S: Steel electrical rigid metal conduit.
12. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
13. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
14. ERMC-SS: Stainless steel electrical rigid metal conduit.
15. FMC: Flexible metal conduit.
16. FMC-A: Aluminum flexible metal conduit.
17. FMC-S: Steel flexible metal conduit.
18. FMT: Steel flexible metallic tubing.
19. FNMC: Flexible nonmetallic conduit. See "LFNC."
20. HDPE: HDPE underground conduit (thick wall).
21. HDPE-40: Schedule 40 HDPE underground conduit.
22. HDPE-80: Schedule 80 HDPE underground conduit.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.

31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
 32. PVC: Rigid PVC conduit.
 33. PVC-40: Schedule 40 rigid PVC conduit.
 34. PVC-80: Schedule 80 rigid PVC Conduit.
 35. PVC-A: Type A rigid PVC concrete-encased conduit.
 36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
 37. RGS: See ERM-C-S-G.
 38. RMC: See ERM-C.
 39. RTRC: Reinforced thermosetting resin conduit.
 40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
 41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
 42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
 43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
 44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.
- C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:
1. AC: Armored cable.
 2. CATV: Coaxial general-purpose cable.
 3. CATVP: Coaxial plenum cable.
 4. CATVR: Coaxial riser cable.
 5. CI: Circuit integrity cable.
 6. CL2: Class 2 cable.
 7. CL2P: Class 2 plenum cable.
 8. CL2R: Class 2 riser cable.
 9. CL2X: Class 2 cable, limited use.
 10. CL3: Class 3 cable.
 11. CL3P: Class 3 plenum cable.
 12. CL3R: Class 3 riser cable.
 13. CL3X: Class 3 cable, limited use.
 14. CM: Communications general-purpose cable.
 15. CMG: Communications general-purpose cable.
 16. CMP: Communications plenum cable.
 17. CMR: Communications riser cable.
 18. CMUC: Under-carpet communications wire and cable.
 19. CMX: Communications cable, limited use.
 20. DG: Distributed generation cable.
 21. FC: Flat cable.
 22. FCC: Flat conductor cable.
 23. FPL: Power-limited fire-alarm cable.
 24. FPLP: Power-limited fire-alarm plenum cable.
 25. FPLR: Power-limited fire-alarm riser cable.
 26. IGS: Integrated gas spacer cable.
 27. ITC: Instrumentation tray cable.
 28. ITC-ER: Instrumentation tray cable, exposed run.
 29. MC: Metal-clad cable.
 30. MC-HL: Metal-clad cable, hazardous location.
 31. MI: Mineral-insulated, metal-sheathed cable.
 32. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
 33. MV: Medium-voltage cable.
 34. NM: Nonmetallic sheathed cable.

35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
 36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
 37. NPLF: Non-power-limited fire-alarm circuit cable.
 38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
 39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
 40. NUCC: Nonmetallic underground HDPE conduit with conductors.
 41. OFC: Conductive optical fiber general-purpose cable.
 42. OFCG: Conductive optical fiber general-purpose cable.
 43. OFCP: Conductive optical fiber plenum cable.
 44. OFCR: Conductive optical fiber riser cable.
 45. OFN: Nonconductive optical fiber general-purpose cable.
 46. OFNG: Nonconductive optical fiber general-purpose cable.
 47. OFNP: Nonconductive optical fiber plenum cable.
 48. OFNR: Nonconductive optical fiber riser cable.
 49. P: Marine shipboard cable.
 50. PLTC: Power-limited tray cable.
 51. PLTC-ER: Power-limited tray cable, exposed run.
 52. PV: Photovoltaic cable.
 53. RHH: (high heat) Thermoset rubber, heat-resistant cable.
 54. RHW: Thermoset rubber, moisture-resistant cable.
 55. SA: Silicone rubber cable.
 56. SE: Service-entrance cable.
 57. SER: Service-entrance cable, round.
 58. SEU: Service-entrance cable, flat.
 59. SIS: Thermoset cable for switchboard and switchgear wiring.
 60. TBS: Thermoplastic cable with outer braid.
 61. TC: Tray cable.
 62. TC-ER: Tray cable, exposed run.
 63. TC-ER-HL: Tray cable, exposed run, hazardous location.
 64. THW: Thermoplastic, heat- and moisture-resistant cable.
 65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
 66. THHW: Thermoplastic, heat- and moisture-resistant cable.
 67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
 68. TW: Thermoplastic, moisture-resistant cable.
 69. UF: Underground feeder and branch-circuit cable.
 70. USE: Underground service-entrance cable.
 71. XHH: Cross-linked polyethylene, heat-resistant cable.
 72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.
- D. Abbreviations and Acronyms for Electrical Flexible Cord Types:
1. SEO: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
 2. SEOW: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp or wet locations.
 3. SEOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
 4. SEOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp or wet locations.
 5. SJEO: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.

6. SJEOW: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp or wet locations.
7. SJEOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.
8. SJEOWW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp or wet locations.
9. SJO: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp locations.
10. SJOW: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp or wet locations.
11. SJOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp locations.
12. SJOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp or wet locations.
13. SJTO: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
14. SJTOW: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp or wet locations.
15. SJTOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
16. SJTOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp or wet locations.
17. SO: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp locations.
18. SOW: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp or wet locations.
19. SOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp locations.
20. SOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp or wet locations.
21. STO: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
22. STOW: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp or wet locations.
23. STOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
24. STOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp or wet locations.

E. Definitions:

1. 8-Position 8-Contact (8P8C) Modular Jack: An unkeyed jack with up to eight contacts commonly used to terminate twisted pair and multiconductor Ethernet cable. Also called a "TIA-1096 miniature 8-position series jack" (8PSJ), or an "IEC 8877 8-pole jack."
2. Authority Having Jurisdiction (AHJ): An organization, office or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.
3. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
4. "BMS"/ "BMC" / "DDC": Building Management System/Building Management Control system/Direct Digital Control system. All terms are for "control systems operating at low or signal voltage." Terms are used interchangeably.

5. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
6. Code: National, State and Local Regulatory Building and Electrical Codes and standards as applicable, including OSHA requirements, mandatory Energy codes, and AHJ interpretations and requirements.
7. Concealed: Concealed from view and protected from physical contact by building occupants. Where installation is outdoor, protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures.
8. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
9. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
10. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
11. Conduit: A structure containing one or more duct raceways.
12. Designated Seismic System: An architectural, electrical, or mechanical system and its components for which the component importance factor is greater than 1.0 when determined in accordance with Section 018123 "Facility Seismic and Wind Criteria."
13. Direct Buried: Installed underground without encasement in concrete or other protective material.
14. Documents or Contract Documents: As used herein, refer to the project contract engineering and design drawings, specifications, shop drawings and general conditions and requirements that compose the Electrical Division 26 "Scope of Work". Also included for use with Electrical Division 26 "Documents" are project-related supporting drawings, specifications, etc. These have been prepared primarily for use by the other-than electrical trades and clarify basic project scope for those trades; these will be made available and shall also be used by Division 26 for reference, clarification and as supplementary sources of project information and intent.
15. Drawings or Contract Drawings: As used herein, refer to the project contract drawings.
16. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.
17. Duct Raceway: A single enclosed raceway for conductors or cable.
18. Electrical Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
19. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
20. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:
 - a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
 - b. Concrete Box: A box intended for use in poured concrete.

- c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
 - d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
 - e. Cover Plate: A cover designed for protecting wiring devices installed in flush-mounted device boxes while permitting their safe operation; also called a faceplate or wallplate.
 - f. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
 - g. Device Box: A box with provisions for mounting a wiring device directly to the box.
 - h. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
 - i. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
 - j. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
 - k. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
 - l. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
 - m. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
 - n. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
 - o. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
 - p. Raised-Floor Box: A floor box intended for use in raised floors.
 - q. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
 - r. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
 - s. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
 - t. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
 - u. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.
21. Engineer or Engineer of Record: Professional Engineer having responsibility and accountability for the electrical engineering and design of the project.
 22. Exposed: Exposed to view. Where outdoors, subject to outdoor ambient temperatures and weather conditions.
 23. Essential Electrical Systems: (healthcare facilities) Those systems designed to ensure continuity of electrical power to designated areas and functions of a healthcare facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system.

24. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.
 - a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical power sources.
25. Finished Spaces: Spaces intended to be fitted- or built-out with furnishing, detail products, and/or painted surfaces.
26. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
27. Home Run: The portion of a branch circuit between the serving panelboard and the first electrical outlet, lighting fixture, or other electrical load connected to the circuit; or, a dedicated circuit between the serving source or panel and the utilization electrical load.
28. Jacket: A continuous nonmetallic outer covering for conductors or cables.
29. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
30. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
31. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
32. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein. Also called "single-line diagram."
33. Owner: As used herein, refers to the property owner, proprietor, administrator or agent as defined in the project contractual agreements.
34. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
35. Protective Device: A device that senses when an abnormal current flow, abnormal voltage potential, or other abnormal electrical waveform exists and then disconnects the affected portion of the circuit from the system. Common protective devices include fuses, circuit breakers, relays, ground-fault circuit interrupters, and arc-fault circuit interrupters.
36. Provide: Furnish, install, wire, and test (or engage and manage an independent testing or commissioning contractor, where specified) ready for service.
37. Public Switched Telephone Network (PSTN): Analog telephone technology that uses twisted pair cables from a telephone-provider central office for the transmission medium. "PSTN" refers to the telephone network; "POTS" refers to the individual subscriber line.
38. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
39. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
40. Scope of Work (or "Work"): All material supply and installations and other labor and appurtenant requirements necessary to complete (and deliver as functional to the satisfaction of the Owner) the electrical installation per the Contract Documents.
41. Sheath: A continuous metallic covering for conductors or cables.
42. Shop Drawings / Vendor Drawings / Submittal Drawings: Documentation, including product drawings, descriptions, instructions, etc., prepared by an equipment manufacturer and/or supplier, as approved by Engineer.
43. Signal voltage or "control voltage": NEC Article 725 remote control, signaling, or power limited circuits which operate at limited voltage (generally 48 volts or less) and/or power levels. "Signal voltage" is typically applied to voltage characteristics of security, access

control, sound, intercom, computer, low voltage lighting control and dimming, "smart building" controls, energy management systems, BMS/BMC and like systems, and similar power limited systems and circuits.

44. Specifications or Contract Specifications: As used herein, refer to the project contract specifications.
45. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
46. "VFD" / "VFC" / "VSD": Variable Frequency Drive / Variable Frequency Controller / Variable Speed Drive (For motor(s)). "VFD", "VFC", and "VSD" are used interchangeably.
47. Voice over Internet Protocol (VoIP): Digital telephone packet technology that uses the internet for its transmission medium.
48. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:
 - a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
 - b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
 - c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
 - d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.
 - e. Medium Voltage (MV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated about 1 kV but not exceeding 69 kV.
 - f. High Voltage: (1) (circuits) Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 69 kV but not exceeding 230 kV. (2) (safety) Having sufficient electromotive force to inflict bodily harm or injury.
49. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.
50. Work: See "Scope of Work".

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section and all other Sections of Division 26.

1.04 GENERAL REQUIREMENTS

- A. All work shall be executed in complete conformance with "Codes/Standards" as defined herein and with Division 1 General Requirements specifications, in addition to Division 26 Electrical Specifications.
- B. Drawings and Specifications form complementary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work may not be specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices, materials, and labor, where necessary for a sound, secure and complete installation. In the event the Drawings and Specifications conflict, the most conservative document shall govern.

- C. Incidental detail that is not shown or specified, but necessary for proper installation and operation shall be included in the work and in these Contractor's estimates, the same as if specified. Locations of all equipment and material shall be adjusted at no extra cost to the Owner, to accommodate the work interferences anticipated and/or encountered. Prior to installation, determine the exact route and location of each raceway and piece of equipment to minimize conflicts with other trades.
- D. Information and components shown on one-line or riser diagrams but not shown on plans, and vice versa, shall be provided as if expressly required on both.
- E. Contractor shall provide systems and components that are fully complete, operational, and suitable for the intended use. All material and all work which may be reasonably implied as being incidental to the work of this section or other applicable sections shall be furnished at no extra cost. In situations where insufficient information exists in the contract documents to precisely describe a certain component or subsystem, or the routing or placement of a component or its coordination with other building elements, the contractor shall include in their bid and scope the specific components or subsystems with all parts necessary for the intended use.

1.05 SCOPE OF DIVISION 26 WORK

- A. Scope of Division 26 work shall include furnishing all labor, supervision, materials, equipment, incidentals, and work required to make ready for use complete functional electrical systems as shown on the Drawings and specified herein.
- B. Contractor or his authorized representative shall, before preparing his proposal, visit all areas of the existing site, buildings, and structures in which work under this Section is to be performed, and carefully inspect the present installation. The submission of the proposal by this Contractor shall be considered evidence that he or his representative has visited the site and noted the locations and conditions under which the work will be performed and that he takes full responsibility for a complete knowledge of all factors governing his work.
- C. The work shall include functional verification of all equipment and wiring at the completion of work and making any minor corrections, changes, or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; substandard work will be rejected.
- D. Where applicable, identify and verify field conditions of all existing underground structures and utilities, including electrical, mechanical, and civil piping.
- E. There may occur situations where specified wire gauges, materials and /or quantities of conductors conflict with the lugs of the equipment to which they are to be connected. In such cases, Contractor shall either provide approved interface connectors or coordinate a solution with the equipment manufacturer or vendor.
- F. Include electrical power utility, conduit, wiring, and wiring termination for all equipment furnished under Division 26 and other Divisions. Included in scope are electrical supply to manufacturing equipment, kitchen appliances, laboratory equipment, shop machines, prefabricated and/or modular furniture, millwork, laundry appliances, architectural appurtenances, dewatering, rain harvesting, energy harvesting/reducing systems, pumps, site utilities, grounds maintenance equipment, and similar equipment.
- G. Unless noted otherwise, scope includes a complete conduit-raceway and/or cable tray/trough system including wiring for nominal 110-120 volt or greater "service" or "supply" or "miscellaneous" power for all electronic/technology and similar system devices and units requiring such supply power from the building infrastructure. Such electronic/technology systems may be furnished under separate Divisions of the Specifications, unless noted otherwise. Coordinate requirements with the electronic/technology system(s) Supplier(s).
- H. Unless noted otherwise, Division 26 Contractor shall furnish and install a complete empty conduit-raceway and/or cable tray/trough system for signal/control/power-limited power wiring (12V, 24V, 48V, etc.), and for related control, signaling, monitoring, data highways, fiber-optic systems, data acquisition, Local Area Networks, Ethernet, SCADA, BacNET, etc., as required

for all electronic/technology and similar systems and devices. Include all raceways, rough-ins, back boxes, supports, cabinets, etc. The supply, installation, and termination of such systems and devices and their required wiring shall be under separate Divisions of Specifications, unless noted otherwise. Review the raceway layout with Owner and technology systems designer/installer, prior to installation, to insure raceway compatibility with the systems and materials being furnished. Install pull strings in all empty conduits.

- I. Unless noted otherwise, include a complete conduit raceway system for all special and/or system cables furnished by electronic alarm, fire alarm, signaling, data, and similar system suppliers. Review the raceway layout with Owner and supplier, prior to installation, to insure raceway compatibility with the systems and materials being furnished.
- J. Where applicable, provide all electrical work associated with the relocation of equipment for existing and new facilities, including disconnection of all existing wiring and conduits and provision of new wiring from the point of electrical supply and conduit to the relocated equipment.
- K. Excavation and backfilling, including gravel or sand bedding for underground electrical work is included in Division 26.
- L. Concrete work, including manholes, handholes, vaults and concrete electrical duct and conduit encasement and electrical equipment and light pole foundations and pads, is included in Division 26.
- M. Contractor shall provide all work for duct banks and underground conduits, including but not limited to excavation, concrete, concrete compaction, forming, conduit, reinforcement, grounding and bonding, backfilling, grading, and disturbed area seeding. Also include all materials and labor required for pipe and conduit jacking, tunneling and boring for underground cable conveyance, trenchless excavation, etc., where required. All work shall be in accordance with this and all other applicable Divisions of these Specifications.

1.06 INTERPRETATION OF CONTRACT DOCUMENTS

- A. Drawings are intended to outline the scope of work required and are not intended to be installation drawings. Drawings are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component nor do they show the exact routings. The purpose of the Drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the Contractor shall provide all other components and materials necessary to make the systems fully complete and operational. The Drawings do not show the exact routings and locations needed to coordinate with structure and other trades and to meet Architectural requirements.
- B. The Drawings are not intended to show exact locations of equipment or conduit runs. The locations of equipment, fixtures, outlets, and similar devices shown on the Drawings are approximate only. Exact locations shall be determined in field by the Contractor, during construction, after coordination with the Owner and/or his designated representative and approval by the Engineer. Obtain in the field all information relevant to the placing of electrical work, and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- C. Unless specifically stated to the contrary, no measurement of an electrical drawing derived by scaling shall be used as a dimension to work by. Dimensions noted on the electrical drawings are subject to measurements of adjacent and previously completed work. Measurements shall be performed prior to the actual installation of equipment.
- D. Dimensions indicated on the Drawings related to electrical equipment locations and/or clearances (relative to walls, column lines, other equipment, etc.) are generally minimum clear dimensions to be maintained as per Code, AHJ, project and/or operating requirements. Such dimensions shall be maintained or exceeded, but not reduced, regardless of actual equipment sizes, which will only be determined after approval of project specific manufacturer's drawings. Concrete pads, vaults, structures, etc., for electrical equipment, where dimensioned on the

Drawings, are estimated dimensions based on typical catalog sizes of electrical equipment on which the design is based. Such dimensions shall be adjusted by Contractor if/as necessary based upon project specific approved manufacturer's drawings.

- E. Conduit and wiring between electrical "field" utilization equipment, loads, motors, instrumentation, etc., and their respective "source" switchgear, motor control center, panelboard, PLC, termination cabinet, etc., are generally shown on the Drawings as "homeruns". Similarly, conduit and wiring between panels may be shown as "homeruns". Contractor's scope, under this Section, shall include determination of the most suitable physical routing of such "homeruns", considering Owner preferences, building layouts, existing conditions, aesthetics, future accessibility, ease of installation, interferences, etc. Where multiple "homeruns" of instrumentation "digital control (1/0, on/off, open/closed, etc.)" or modulating "analog control (4-20 mA DC)" or similar wiring run from the same "field" location or from the same panel to the same "source" location, Contractor may replace multiple wiring conduits with larger (common) conduits so as to provide an economical and practical installation. However, "digital" and "analog" or similar "category" of wiring shall each be kept segregated and not share the same (common) conduits with any other wiring "categories". Also, Contractor shall not combine power wiring into larger (common) conduits except in limited situations as specifically allowed by the Contract Documents.
- F. Electrical loads (KVA, KW, Horsepower, Amperes, etc.) and wiring requirements indicated on the electrical Drawings are estimates representative of the "basis of design" standard electrical, mechanical and building equipment. Electrical equipment ratings, bus ratings, circuit wire sizes, circuit wire quantities, conduit sizes, conduit quantities and overcurrent protection device ratings indicated on the Drawings are based on such equipment. Contractor is advised that prior to installation he must compare indicated electrical equipment ratings, wire sizes and quantities, conduit sizes and quantities and overcurrent protective device ratings versus approved shop drawings of actual equipment being furnished. Contractor shall provide electrical materials conforming to the requirements of the actual equipment being furnished (except where otherwise required by Code), reflecting increased ratings, wire sizes and quantities, conduit sizes and quantities and overcurrent protective device ratings where required. Overcurrent protective device ratings shall be decreased if required to match actual equipment requirements and/or manufacturer's recommendation. Other electrical ratings, wire sizes and quantities and conduit sizes and quantities shall not be decreased to less than that indicated on the electrical Drawings.
- G. Equipment short circuit interrupting, fault, and/or withstand ratings are indicated on the Drawings and/or Specifications. These ratings equal or exceed design Engineer's determination of approximate short circuit levels based on standard data available at the time of design. Such determinations may reflect "worse condition" situations and allow for unknown/unavailable/unreliable data at time of design. Such data typically includes Utility Company available fault levels, service transformer ratings, type, location, etc. Also note that Engineer's design may indicate equipment with higher ratings than required by specific application, in cases where there is a desire for standardization of equipment throughout the project. Contractor shall furnish equipment meeting such indicated minimum ratings. In cases where short circuit studies completed subsequent to system design indicate that higher ratings are appropriate, such situations shall be submitted to Engineer for resolution.
- H. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect and/or Engineer for review and approval.
- I. Minimum wire sizes shall be as indicated, except that Contractor shall increase wiring sizes for feeders and branch circuits, to limit voltage drop to 2 percent and 3 percent respectively, where necessary based on circuit lengths.
- J. Unless specifically noted or permitted, all electrical equipment shall be fully rated. Full ratings shall include full fault duty, short-circuit interrupting and short-circuit withstand ratings, based on the actual available calculated maximum fault, not based on a fault level theoretically reduced through application of an upstream series-connected fault- limiting or reducing device; the use

of equipment rated or de-rated for use in such “series-rated or series-connected” applications shall not be permitted.

- K. The Contract Drawings, as clarified above, are intended for general use to outline the scope of work only; they are not intended to be installation drawings. Accordingly, Contractor is advised that (even though not specifically indicated on the Drawings) he shall follow NEC throughout, including Article 300. Portions of this Article relate to installations being such that spread of fire and products of combustion are eliminated or mitigated. As described and specified, use third party approved fire seals, through-penetration firestops, fire rated padding, fire-rated sealants and like products in order to comply. In addition, maintain minimum of 24” horizontal separation between (outlet) boxes on opposite sides of the same fire rated wall. Note that this spacing is generally NOT indicated to scale on the Contract Drawings. Refer to UL Guide Information for electrical equipment (The White Book) for application information.
- L. Lighting Control Systems - Lighting control system architecture and components vary significantly between manufacturers and between projects. Systems may employ full automation, computer programs, overrides, occupancy monitoring, daylight harvesting, energy conservation, dimming, scene control, etc. The Contractor is advised that the Contract Drawings will typically indicate a control scheme and/or control matrix intended to clarify the intended performance of the lighting control system on a room-by-room or space- by-space basis. In addition to this, the Drawings will often indicate the type of control devices in a particular room or space which are intended to be employed as an aid when developing the lighting control system design. A system design of sufficient detail to be installed in the field will be particular to a manufacturer, and so it is expected that the Contractor shall furnish a complete and detailed manufacturer-specific hardware and wiring design, in accordance with Contract Drawings and Specifications for Engineer’s approval.

1.07 COORDINATION WITH UTILITY COMPANIES

- A. Where applicable it is intended that Contractor coordinate with the Electric Utility Company, to the extent necessary and as intended by the Contract Documents, so that an appropriate, complete and reliable electrical service or supply is provided for this project.
- B. Where applicable, the Contractor shall be responsible for receiving and handling Electric Utility Company costs and invoices that are assessed the Owner for the installation of the permanent electric service. It is the responsibility of the Contractor to obtain those costs from the Utility Company and include them in Contractor’s own bid and/or invoice, where applicable. Unless otherwise indicated or negotiated, Contractor shall include in his project scope and bear responsibility for coordination and completion of all requisite work as required by Utility including the following:
 - 1. Project service transformer pad, vault, and/or work to enable/facilitate Utility interface or “point-of-tie-in” interface. Include supply of service transformer and/or installation where so directed by Utility and/or Contract documents.
 - 2. Determination and implementation of Utility requirements, standards, codes, regulations, and locations of major equipment, including project service transformer(s).
 - 3. Empty conduit with pull wire or conduit sleeves between project service transformer(s) and Utility primary voltage point-of-tie-in, as per Utility. Include primary wiring where so directed.
 - 4. Utility requirements for metering and installation.
 - 5. Complete conduit and wiring and termination of secondary voltage conductors between the project service transformer(s) and the project service entrance or otherwise indicated equipment.
 - 6. Concrete encasement of primary and/or secondary conductors when required by Utility and/or called for on the Contract Drawings.
 - 7. Utility required clearances, grounding, signage, and all miscellaneous appurtenances, including fencing if required. Include fence grounding and bonding per NEC, NESC, and/or Utility Company requirements.

- C. Contractor shall complete applicable Utility forms and comply with and respond to Utility requests for information. Such are as related to, but not limited to, sizes and types of new electrical loads, existing loads to remain, existing loads to be deleted, anticipated load diversity/demand, generators, and size, rating and characteristics of Owner's new and existing electrical equipment, etc., to the extent required by the Utility Company. Intent is that Utility Company will, from such coordination with Contractor, be able to finalize Utility's incoming electrical service ratings and details, service transformer(s) ratings and details, and proper interconnection with Owner's equipment.
- D. Interface with the services provided by the Telephone, Data, and other Systems Utility Companies/Service Providers. Unless indicated otherwise, furnish and install 4-foot x 8 foot x 3/4 inch painted (fire retardant paint) plywood backboard at designated location within the site and two 4-inch underground non-metallic conduits with pull-wire between the backboard and each point of interface as required. Run two separate 4-inch conduits for each service.

1.08 COORDINATION WITH OTHER TRADES

- A. Provide complete coordination with other contractors. Division 26 Contractor shall coordinate with other contractors regarding each others equipment and equipment submittals and shall obtain all relevant submittals and incorporate/accommodate all resulting variances into the design and installation.
- B. Where applicable, include complete electrical heat tracing system for all piping which is indicated as electrically traced on the project Piping and Instrumentation Diagrams and/or project Mechanical Drawings/Specifications. Contractor shall employ the services of an approved heat-tracing product manufacturer to provide detailed system design. System shall protect piping and appurtenances against freezing or shall maintain temperatures, as required. System shall include code-compliant, environmentally suitable and properly sized self-regulating heat tracing cables, and all related requisite power source and control equipment, panels, transformers, circuitry, contactors, controls, etc. necessary for a complete and functional heat tracing system. Installation and testing shall be performed by the contractor.
- C. Include nominal 110-120 volt or greater power and control wiring, service, connections, and appropriate raceway for all equipment and devices requiring such power and/or control. Include wiring in conduit for heating, ventilating, air conditioning (HVAC), mechanical and/or plumbing equipment; building equipment, process equipment, including electronic systems (fire alarm, security, life safety, mass notification and similar), and appurtenances furnished under all Divisions of these Specifications, or provided by Owner. Include power wiring for all air handlers, fans, condensing units, PIUs, terminal units, fan coil units, variable air volume units (VAVs), dampers, louvers, motorized operators, valves, elevators, motorized doors, powered doors, gates, operators, cranes, pumps, compressors, tools, controllers, packaged equipment, manufacturing equipment, and any and all other similar building or process equipment covered by this Division and other Divisions Drawings and/or Specifications.
- D. Circuits Supplying Fire Alarm Systems:
 1. Branch circuits supplying fire alarm equipment shall be dedicated to the fire alarm system equipment and shall serve no other loads.
 2. Branch circuits supplying fire alarm equipment shall be dedicated to the fire alarm system equipment and shall serve no other loads.
 3. Fire alarm equipment branch circuits supplying shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.
 4. Circuit disconnecting means shall be red in color, or shall utilize red identifying and distinguishing features.
 5. Circuit disconnecting means shall employ a locking device and shall be accessible to authorized personnel.
 6. The location of the fire alarm circuit disconnecting means shall be permanently identified at the fire alarm control panel.
 7. Circuit overcurrent device shall be identified as "Fire Alarm Circuit".

- E. Provide power and control wiring and conduit from power source to equipment physical locations and provide wiring terminations as required both at the source and at the equipment. If/as required, provide transformers, rectifiers, and/or inverters to match the source voltage to the electrical utilization characteristics of the load or system. Provide disconnects, fusing, enclosures, etc., to make installation Code compliant.
- F. Unless noted otherwise, excluded from Division 26 responsibility are conduit and wiring for other Division furnished "HVAC Controls", "Building Management Systems (BMS)", or "Direct Digital Control (DDC) Systems" controls that require/operate at only "signal voltage level" (typically 48 volts or less). Note that certain projects may require Electrical Contractor to furnish and install empty conduit (or similar) with pull-strings, for such systems.
- G. Conduit, wire, field connections, and installation for all motors, motor controllers, variable frequency drives (VFDs), control devices, control panels, and "packaged" equipment furnished under Division 26 or other Divisions of these Specifications are included in Division 26 scope.
- H. Contractor shall review the submittal/shop drawings for all electrically operated and/or electrically connected equipment being furnished under all other Divisions of the Specifications for this project. Unless specified otherwise, Contractor shall provide raceway, wire and interconnection for all materials, devices, components, systems and packages requiring "field wiring", to the extent clarified in the paragraphs herein. Where applicable, Contractor shall make electrical interconnections per manufacturer's requirements. This includes, but is not limited to, devices/components that are parts of "packages" but which are shipped separately and require field interconnection. Also, Contractor shall identify terminals and prepare drawings or wiring tables to extent necessary to enable interconnections.
- I. Coordinate arrangement, mounting, and support of equipment and raceways:
 1. To maintain maximum headroom; all piping, duct, conduit and associated components to be as tight as possible to underside of structure to provide for ease of disconnecting the equipment with minimum interference to other installations. (Exceptions to this general rule must be followed. For example, where Code requires a minimum distance below structural roof to electrical raceway so as to mitigate effects of thermal radiation.)
 2. To allow right of way for piping installed at required slope.
 3. To allow connecting raceways, cables, wireways, cable trays, and busways to be clear of obstructions and of the working and access space of other equipment.
- J. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structure components as they are constructed.
- K. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.
- L. Prior to installation of exposed material and equipment (including access panels) in finished spaces, review Architectural Drawings for desired locations and where not definitely indicated, request information from Architect.
- M. Coordinate with mechanical and plumbing piping routes to ensure that liquid-conveying piping systems are not installed above interior electrical or electronic equipment, including but not limited to: switchgear, switchboards, panelboards, motor control centers, control panels, motor and equipment disconnects and starters, variable frequency drives, rectifiers, electrical enclosures, transformers, uninterruptable power supplies, telephone switching equipment, data communications switching and routing equipment, and fire alarm system cabinets.
- N. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades. Systems shall be run parallel with or perpendicular to major architectural and structural building elements.

1.09 SEISMIC AND WIND-RESTRAINT REQUIREMENTS

- A. Conform to the requirements indicated in Code and/or on the structural and/or other Contract Documents, where applicable.

- B. It shall be the responsibility of the equipment manufacturers and suppliers along with the contractor to conform to the seismic and wind-restraint design requirements based on the project's seismic classification and/or codes and/or contract documents.
- C. All electrical equipment enclosures, anchors, raceways, supports, lighting, trays, etc. shall utilize earthquake resistant supporting systems as required by the project's seismic classification and/or Codes and/or Contract Documents.
- D. Electrical distribution, generating, and power control equipment shall be labeled by the equipment manufacturer as "seismic qualified". This labeling shall be indicative that representative samples of the same equipment have been tested and found to meet or exceed the seismic requirements of the applicable code for the applicable project seismic classification. Contractor shall install such equipment in accordance with these codes and the manufacturer's recommendations. Large equipment seismic labeling applies to panelboards, switchboards, motor control centers, busway, transfer switches, switchgear, transfer switches, UPS and similar systems, battery installations, transformers, power centers, metal clad or metal enclosed switchgear, load centers, safety switches, enclosed control assemblies, and generators and generator fuel delivery and storage systems.

1.10 SEQUENCING

- A. Conduct and submit results of power system studies before submitting product data and Shop Drawings for electrical equipment.
- B. Submit coordination drawings for equipment spaces with electrical equipment product data submittals.

1.11 ACTION SUBMITTALS

- A. Coordination Drawings for Equipment Spaces: Show coordination of electrical equipment, and equipment provided by other trades or by Owner, within electrical rooms, telecommunication equipment rooms, mechanical rooms that will house electrical equipment, or similar spaces that will house more than a single panelboard:
 1. Drawing(s) shall be prepared using a computer aided drafting (CAD) software program.
 2. Drawing(s) shall be produced at 1/4" = 1'-0" scale or larger, with an accuracy of +/- 1/2".
 3. Drawing(s) shall be transmitted in Portable Document Format.
 4. Prepare drawing(s) using equipment dimensions representative of actual equipment intended to be installed.
 5. Include dimensions of the room or space, equipment, code-required working clearances, manufacturer's required clearances, access panel locations, and similar.
- B. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.
- C. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Suspended ceiling components.
 2. Structural members to which equipment and suspension systems will be attached.
 3. Size and location of access panels on ceilings.
 4. Elevation, size, and route of sprinkler piping.
 5. Elevation, size, and route of plumbing piping.
 6. Elevation, size, and route of ductwork.
 7. Elevation, size, and route of cable tray.
 8. Elevation, size, and route of conduit.
 9. Elevation and size of wall-mounted and ceiling-mounted equipment.
 10. Access panels.
 11. Sprinklers.

12. Air inlets and outlets.
 13. Control modules.
 14. Luminaires.
 15. Communications devices.
 16. Speakers.
 17. Security devices.
 18. Fire-alarm devices.
 19. Indicate clear dimensions for maintenance access in front of equipment.
 20. Indicate dimensions of fully open access doors.
- D. Coordination Drawings for Larger than 2" Trade Size Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
1. Structural members in paths of conduit groups with common supports.
 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- E. Coordination Drawings for Duct Banks:
1. Show duct profiles and coordination with other utilities and underground structures.
 2. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

1.12 INFORMATIONAL SUBMITTALS

- A. Electrical Installation Schedule: Prior to beginning work, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:
1. Submission of power system studies.
 2. Submission of specified coordination drawings.
 3. Submission of action submittals specified in Division 26.
 4. Orders placed for major electrical equipment.
 5. Arrival of major electrical equipment on-site.
 6. Preinstallation meetings specified in Division 26.
 7. Utility service outages.
 8. Utility service inspection and activation.
 9. Mockup reviews.
 10. Closing of walls and ceilings containing electrical Work.
 11. System startup, testing, and commissioning activities for major electrical equipment.
 12. System startup, testing, and commissioning activities for emergency lighting.
 13. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
 14. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
 15. Requests for special inspections.
 16. Requests for inspections by authorities having jurisdiction.
- B. Installation Schedule for Communications Systems: Prior to beginning work, provide schedule for installation of the communications Work to Owner and Architect including, but not limited to, milestone dates for the following activities:
1. Submission of specified coordination drawings.
 2. Submission of action submittals specified in Division 27.
 3. Orders placed for major equipment.
 4. Arrival of major equipment on-site.
 5. Preinstallation meetings specified in Division 27.
 6. Telephone and internet service outages.
 7. Telephone and internet service inspection and activation.
 8. Mockup reviews.

9. Closing of walls and ceilings containing the communications Work.
 10. System startup, testing, and commissioning activities for communications equipment.
 11. System startup, testing, and commissioning activities for the Work specified in other divisions that depends on the Work specified in Division 27.
 12. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
 13. Requests for special inspections.
 14. Requests for inspections by authorities having jurisdiction.
- C. Installation Schedule for Security, Fire-Alarm, and Other Life-Safety Systems: Prior to beginning work, provide schedule for installation of security, fire-alarm, and the other life-safety Work to Owner and Architect including, but not limited to, milestone dates for the following activities:
1. Submission of specified coordination drawings.
 2. Submission of action submittals specified in Division 28.
 3. Orders placed for major equipment.
 4. Arrival of major equipment on-site.
 5. Preinstallation meetings specified in Division 28.
 6. Security and fire-alarm system outages.
 7. Security and fire-alarm system inspection and activation.
 8. Mockup reviews.
 9. Closing of walls and ceilings containing the security and fire-alarm Work.
 10. System startup, testing, and commissioning activities for security and fire-alarm equipment.
 11. System startup, testing, and commissioning activities for fire-alarm interfaces with the Work specified in other divisions.
 12. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
 13. Requests for special inspections.
 14. Requests for inspections by authorities having jurisdiction.
- D. Welding certificates.
- E. Seismic Performance Certificates: Provide special certification for designated seismic systems as required to meet requirements specified in Section 018123 "Facility Seismic and Wind Criteria" for all designated seismic systems identified on the Drawings or in the Specifications.
1. Include the following information:
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - d. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
 - e. Equipment manufacturer's written certification for each designated active electrical seismic device and system, stating that it will remain operable following the basis-of-design seismic criteria specified in Section 018123 "Facility Seismic and Wind Criteria."
 - f. Equipment manufacturer's written certification that components with hazardous contents maintain containment following the basis-of-design seismic criteria specified in Section 018123 "Facility Seismic and Wind Criteria."
 - g. Evidence demonstrating compliance with these requirements for approval to authorities having jurisdiction after review and acceptance by qualified structural professional engineer.

- F. Wind Performance Certificates: Provide special certification for systems and components designated on the Drawings or in the Specifications to be subject to high wind exposure and impact damage.
 - 1. Include the following information:
 - a. Provide equipment manufacturer's written certification for each designated system and component, stating that it will remain in place and operable following the design wind event and comply with requirements of authorities having jurisdiction.
 - b. Certification must be based on ICC-ES or similar nationally recognized testing standard procedures acceptable to authorities having jurisdiction.
- G. Qualification Statements:
 - 1. For structural professional engineer.
 - 2. For electrical professional engineer.
 - 3. For welder.
 - 4. For ERMC-S-PVC raceway Installer.
 - 5. For medium-voltage cable Installer.
 - 6. For medium-voltage duct Installer.
 - 7. For medium-voltage equipment Installer.
 - 8. For lightning protection system Installer.
 - 9. For power quality specialist.
 - 10. For medium-voltage and low-voltage electrical testing agency and on-site electrical testing supervisor.
 - 11. For structural testing and inspecting agency.
 - 12. For communications design professional.
 - 13. For communications cable Installer.
 - 14. For communications testing agency and on-site communications testing supervisor.
 - 15. For fire-alarm professional engineer.
 - 16. For fire-alarm cable Installer.

1.13 CLOSEOUT SUBMITTALS

- A. RECORD DOCUMENTS
 - 1. Record Drawings are specified in Division 01 Section "Project Record Documents."
 - 2. The Contractor shall keep a detailed up-to-date record, of the manner and location in which installations are actually made, indexing each feeder, pull box and protective device. Record documents are to reflect all changes in work including change orders, field directives, addenda from bid set of Contract Documents, request for information responses, etc. Upon completion of the project, the Contractor shall modify the project electronic drawing and specification files to incorporate this information. Modified documents shall be turned over to the Owner in both electronic and hard paper copy formats. Record drawings shall also include:
 - a. Locations of buried conduit and similar items. Include burial depth.
 - b. Field changes of dimension or detail.
 - c. Details not on original contract drawings.
 - d. Changes to circuit numbers.
 - e. Junction box locations and conduit runs, with trade sizes indicated, for lighting, power, and electrical systems installed.
 - f. Final panel schedules on drawings matching Contract Drawing size.
- B. Operation and Maintenance Data:
 - 1. Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device installed as part of the Project.
 - 2. Include the following information:
 - a. Manufacturer's operating specifications.
 - b. User's guides for software and hardware.

- c. Schedule of maintenance material items recommended to be stored at the Project site.
 - d. Detailed instructions covering operation under both normal and abnormal conditions.
 - e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
 - f. List of load-current and overload-relay heaters with related motor nameplate data.
 - g. List of lamp types and photoelectric relays used on the Project, with ANSI and manufacturers' codes.
 - h. Manufacturer's instructions for setting field-adjustable components.
 - i. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
 - j. EPSS: Manufacturer's system checklists, maintenance schedule, and maintenance log sheets in accordance with NFPA 110.
 - k. Exterior pole inspection and repair procedures.
- C. Software and Firmware Operational Documentation: Provide software and firmware operational documentation, including the following:
- 1. Software operating and upgrade manuals.
 - 2. Names, versions, and website addresses for locations of installed software.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
 - 5. Testing and adjusting of panic and emergency power features.
 - 6. For lighting controls, include the following:
 - a. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
 - b. Operation of adjustable zone controls.
- D. Software:
- 1. Provide to Owner upgrades and unrestricted licenses for installed and backup software, including operating systems and programming tools required for operation and maintenance.

1.14 MOCKUPS

- A. Simple Mockups for Coordinating Accessibility of Electrical Devices around Fixed Furnishings and Equipment:
- 1. Build simple mockups using sample fixtures and representative materials for verification of general arrangement, actual dimensions, and aesthetics of lighting fixtures installed in or attached to prefabricated assemblies provided under other Divisions, included but not limited to, prefabricated metal canopy structures, pre-fabricated engineered metal building truss systems (for high bay lighting), and linear/tape-style lighting integrated into window mullions, casework, or similar architectural features, prior to fabrication and installation of Work. Depict products from all Divisions requiring coordination, including, but not limited to, fixed furnishings, casework, outlet covers and plates, HVAC controls, exposed raceway, exposed plumbing, equipment, and signage.
- B. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

1.15 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 110 - Standard for Emergency and Standby Power Systems; 2025.
- D. UL 62368-1 - Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 SUBSTITUTION LIMITATIONS FOR ELECTRICAL EQUIPMENT AND FIXTURES

- A. Substitution requests for electrical equipment will be entertained under the following conditions:
 - 1. Substitution requests may be submitted for consideration prior to beginning work if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
 - 2. Substitution requests may be submitted for consideration concurrently with submission of power system study reports when those reports indicate that substitution is necessary for safety of maintenance personnel and facility occupants.
 - 3. Contractor is responsible for sequencing and scheduling power system studies and electrical equipment procurement.
- B. Substitution requests for lighting fixtures will be entertained under the following conditions:
 - 1. Substitution requests may be submitted for consideration prior to beginning work if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
 - 2. Substitution requests for fixtures must be accompanied by studies indicating photometric performance is equal to or better than that of the basis of design lighting fixture package. Studies shall indicate performance under normal utility power and emergency (loss of utility) conditions. Studies shall also confirm applicable lighting power density limits, such as those imposed by building and energy codes, are not exceeded.
 - 3. Contractor is responsible for sequencing and scheduling photometric studies and fixture procurement for substitution requests.

2.02 SUBSTITUTION LIMITATIONS FOR COMMUNICATIONS EQUIPMENT

- A. Substitution requests for communications equipment will be entertained under the following conditions:
 - 1. Substitution requests may be submitted for consideration prior to beginning work if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
 - 2. Contractor is responsible for sequencing and scheduling equipment procurement. Insufficient lead time for equipment delivery will not be considered a valid reason for substitution.

2.03 SUBSTITUTION LIMITATIONS FOR ELECTRONIC SAFETY AND SECURITY EQUIPMENT

- A. Substitution requests for electronic safety and security equipment will be entertained under the following conditions:
 - 1. Substitution requests may be submitted for consideration prior to beginning work if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
 - 2. Contractor is responsible for sequencing and scheduling equipment procurement. Insufficient lead time for equipment delivery will not be considered a valid reason for substitution.

PART 3 EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless otherwise indicated.

- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Yield to piping systems installed at a required slope.
- F. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.02 CONCRETE PADS

- A. Construct concrete bases of dimensions indicated but not less than 2 inches (100 mm) larger in both length and width directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base. Height of base shall be as indicated, but not less than 3 inches.
- B. For pads supporting equipment requiring minimum front working space or clearance as defined in the NEC, pad shall be flush with the front of the equipment. This requirement may be waived if special, written permission is granted by the AHJ.
- C. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete, unless noted otherwise. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- D. Anchor equipment to concrete base.
- E. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- F. Install anchor bolts to elevations required for proper attachment to supported equipment.
- G. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
- H. Provide raised concrete pads for all floor mounted electrical equipment, including but not limited to, switchboards, transformers, motor control centers, transfer switches, lighting control/dimmer cabinets, and large motor controllers.

3.03 FIREPROOFING

- A. Clips, hangers, clamps, supports and other attachments to surfaces to be fireproofed shall be installed, insofar as possible, prior to start of spray fiber work.
- B. Piping and other items which would interfere with proper application of fireproofing shall be installed after completion of spray fiber work.
- C. Patching and repairing of fireproofing due to cutting or damaging to fireproofing during course of work specified under this Section shall be performed by installer of fireproofing and paid for by trade responsible for damage and shall not constitute grounds for extra cost to Owner.

3.04 MAJOR ELECTRICAL EQUIPMENT

- A. Investigate each space in the structure through which equipment must pass to reach its final location. If necessary, the manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the structure.
- B. The equipment shall be kept upright at all times. When equipment has to be tilted for ease of passing through such restricted areas during transportation, the manufacturer shall be required to brace the equipment suitably, to ensure that the tilting does not impair the functional integrity of the equipment.

3.05 INSTALLATION ONLY ITEMS

- A. Where this Contractor is required to install items which are purchased and/or furnished by others, he shall coordinate their delivery and be responsible for their unloading from delivery vehicles and for their safe handling and field storage up to the time of installation. This contractor shall be responsible for:
- B. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.
- C. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building systems.
- D. This Contractor shall carefully examine such items upon delivery. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of work of this Contractor will be considered only if presented in writing within one week of their date of delivery. Unless such claims have been submitted, this Contractor shall be fully responsible for the complete reconditioning or replacement of the damaged items.

3.06 PAINTING

- A. Furnish one can of aerosol-free touch-up paint for each different color factory finish which is to be the final finished surface of the product.

3.07 CLEANING

- A. Cleaning shall be performed prior to equipment being energized.
- B. Raceways:
 - 1. Cover all raceway openings prior to the installation of conductors to prevent dirt, moisture, and other debris from entering the raceways.
 - 2. Before pulling conductors, swab out all raceways to remove any debris that may have entered raceways during construction or during storage.
 - 3. When external surfaces of raceways or enclosures are rusted, clean and restore surfaces to original condition.
- C. Equipment:
 - 1. After completion of work but prior to turning equipment over to the Owner, clean the exterior surfaces to be free from concrete residue, dirt, paint residue, etc.
 - 2. All dirt, drywall dust, and all other foreign matter shall be blown from, wiped away, or vacuumed from transformer coils, terminal devices, panelboard interiors, switchboard interiors, junction boxes, pullboxes, and other similar equipment enclosures.
 - 3. Thoroughly clean equipment of all stains, paint spots, dirt, and dust. Remove all temporary labels not used for instruction or operation and remove all visible trade labels.

3.08 CEILING ACCESS AND OTHER ACCESS PANELS

- A. Access panels are generally not shown on Drawings but are required to be provided and installed by the Contractor.
- B. Access panels shall be of size required to provide adequate access to equipment. Minimum size shall be 12" X 12" for hand access or 24" X 24" for body access. Minimum 16 gauge frame, not less than 18 gauge hinged door panel. Door locks shall be screwdriver operated for panels in general location applications and shall be key locked for public area applications.
- C. Furnish and install access panels so that electrical transformers, boxes, devices, fixtures, valves, etc. that have electrical connections, and/or require maintenance, operation, or adjustment are made accessible. Include access panels for such equipment in otherwise inaccessible locations, including those concealed in floor, wall, and furred spaces or above ceiling. Access panels shall be by Milcor, Knapp, Nystorm or Inland Steel; coordinate selection with other Sections supplying similar access panels. Color of panel shall be selected by the Architect.

- D. Panels shall include concealed hinges, cam type locking devices, and shall have a frame border type necessary for the particular wall or ceiling construction in which they are installed. Access panels shall be flush mounted, recessed frame type units. Access panels shall be prime coated steel, for field painting for general applications and stainless steel for use in toilet rooms, shower rooms, and similar wet locations.
- E. Access panels shall have same fire rating classification as surface penetrated. Rated access panels must have U.L. Label.

3.09 TESTS AND SETTINGS

- A. Test (or engage and manage an independent testing or commissioning contractor, where specified) all systems furnished under Division 26 and repair or replace all defective work. Make all necessary adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.
- B. Complete all work as detailed in applicable project Specifications, "Commissioning of Electrical Systems" and "Acceptance Testing and Calibration", or equivalent.
- C. Make the following minimum field tests and checks (or engage and manage an independent testing or commissioning contractor, where specified). Where possible, make tests and checks prior to energizing electrical equipment. Tests shall be in accordance with manufacturer's requirements and suggestions, industry standards, and with the requirements outlined in the specific Sections of these Specifications. General Testing shall include NETA (National Electrical Testing Association) required and recommended testing of the following systems and equipment:
 1. Mechanical inspection, testing and setting of all circuit breakers, disconnect switches, motor starters, control equipment, etc., for proper operation.
- D. Grounding system.
- E. Switchgear and switchboards.
- F. Motor control centers.
- G. Transformers.
- H. Wires and cables.
- I. Substations and protective relaying.
- J. Variable frequency drives/controllers.
- K. Wire and cable terminations. Verify that connections meet the equipment's torque requirements. Verify control wire continuity via bell/buzzer test. Megger all power wire and cable. Record all results.
- L. Set all transformer taps as required in order to obtain the proper secondary voltage.
- M. Check motor nameplates for correct phase and voltage. Check bearings for proper lubrication.
- N. Check the ampere rating and setting of all motor circuit protectors, circuit breakers, fuses, thermal overloads for motors, etc., and submit a typed record to the Engineer of same, as well as locations and designations, listing the nameplate service factor, horsepower, and full load current. If inconsistencies are found, new thermal elements shall be supplied and installed by this Contractor.
- O. Check rotation of all motors, obtain permission from the Owner to start the motors, and proceed to check it for proper rotation. If it rotates in the wrong direction, correct the rotation at the motor. Take all necessary precautions not to damage any equipment.
- P. Carefully check interlocking, control and instrument wiring for each system, and/or part of a system to ascertain that the system will function properly and as indicated by schematic and wiring diagrams where applicable.
- Q. Confirm that all panels, switchboards and similar load centers have had loads "equally" balanced among the electrical phases, such that no individual phase load varies from the other

phases by more than 15%. Make circuit revisions to achieve this balance, if necessary. Record any and all modifications.

- R. Provide all instruments, personnel and equipment required for the tests specified herein.
- S. Check and confirm that all equipment short circuit interrupting and withstand ratings are adequate for the calculated available system fault levels at the point of equipment connection to the electrical system.
- T. Confirm that short circuit, arc-flash, remote disconnect location, danger, warning, identification and other signs and labels have been provided and installed, per Code, where applicable.
- U. All testing shall be scoped, planned, scheduled and coordinated by the Contractor. Notify the Owner at least two (2) weeks in advance of conducting tests. The Contractor shall have qualified personnel present during all testing.
- V. The following additional tests and checks shall be made prior to the energizing of medium- or high-voltage electrical equipment. Contractor shall engage the services of an independent testing firm. Tests shall be conducted by the independent testing firm, and a certified test report shall be submitted stating that the equipment meets and operates in accordance with the manufacturers and job specifications, and that equipment and installation conforms to all applicable standards and specifications:
 - 1. Setting and testing of protective relays and circuit breaker adjustable trip characteristics for calibration and proper operation.
 - 2. Over potential, high potential, insulation resistance, and shield continuity tests for medium voltage cables.
 - 3. Verification of proper installation of all medium voltage cable terminations and splices. Include terminations employing stress cones, pot-heads, heat shrink, lead terminations, manual methods, etc.
 - 4. Mechanical inspection of switches and circuit breakers to assure proper operation.
- W. Certified test reports shall be furnished to the Engineer for all tests.
- X. Contractor and/or his independent testing contractor (where applicable) shall be responsible for the following:
 - 1. Supply of all electrical equipment, components, systems, and qualified manpower, as applicable, to provide for and execute complete electrical testing, system testing, and acceptance testing and calibration as specified in the Contract Documents and/or as required.
 - 2. Commissioning of electrical systems unless noted otherwise.
 - 3. Testing submittal preparation, testing plan, scheduling, start-up procedures, functional testing, attendance at meetings, testing results recording and documentation.
 - 4. Demonstration and training.
 - 5. Operations and maintenance manuals.
 - 6. Project close out data (bonds, warranties, spare parts, record documents and maintenance service agreements).
- Y. Set all relays, protective devices, breakers, etc., in accordance with findings and recommendations of the Electrical Protective Device Coordination Study and of the equipment manufacturer.
- Z. Infra-red hot spot inspection shall be made of all switchgear, switches, power, and control panels. This shall be done under representative load conditions before the equipment is used by the Owner and again three (3) months before expiration of the one (1) year warranty period.
- AA. Furnish and install Arc-Flash Warning Signs in accordance with NEC and NESC and Project Documents.

END OF SECTION 260510

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Oxide inhibiting compound.
- G. Wire pulling lubricant.
- H. Cable ties.
- I. Firestop sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260510 - Common Work Results for Electrical.
- C. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2024).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers; 2005 (Reapproved 2021).
- F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation; 2018 (Reapproved 2023).
- G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2024.
- H. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- J. NECA 104 - Standard for Installing Aluminum Building Wire and Cable; 2012.
- K. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.
- L. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
- M. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.

- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- P. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- Q. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.
- R. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- S. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- T. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- U. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- V. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
 1. Indicate selections to be used in the project.
 2. Indicate applications for each product type to be installed within plenum spaces, hazardous environments, and in wet locations.
- C. Shop Drawings: Where aluminum conductors have been substituted for copper conductors, submit dimensioned drawings indicating the following:
 1. The route and length of substituted circuits.
 2. Voltage drop calculations for each substituted circuit, including the circuit load(s) used in the calculations.
 3. The size of each conductor, conductor grouping/arrangement, and conduit quantities and sizes.
- D. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- E. Field Quality Control Test Reports.
- F. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
 - 1. Exceptions:
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
 - 1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet or junction box to panelboard.
 - 2. In addition to other applicable restrictions, may not be used:
 - a. Where not approved for use by the authority having jurisdiction.
 - b. Where exposed to damage.
 - c. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 260526.
- H. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

- I. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- J. Conductor Material:
 - 1. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 - a. Substitution of aluminum conductors for copper is permitted, when approved by Owner and authority having jurisdiction, as indicated on plans. Where not indicated on plans or otherwise prohibited, aluminum conductors may be used as follows:
 - 1) Services: Copper conductors size 1/0 AWG and larger.
 - 2) Feeders: Copper conductors size 1/0 AWG and larger.
 - b. Where aluminum conductors are substituted for copper, comply with the following:
 - 1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
 - 2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
 - 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- K. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
- L. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- M. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. 240/120 V High-Leg Delta, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B (High-Leg): Orange.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.

- d. 240/120 V, 1 Phase, 3 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Neutral/Grounded: White.
- e. Equipment Ground, All Systems: Green.
- f. Isolated Ground, All Systems: Green with yellow stripe.
- g. Travelers for 3-Way and 4-Way Switching: Pink.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Installed Underground: Type XHHW-2.
 - 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

2.04 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Provide oversized neutral conductors.
- F. Provide dedicated neutral conductor for each phase conductor.
- G. Grounding: Full-size integral equipment grounding conductor.
- H. Armor: Steel, interlocked tape.
- I. Provide PVC jacket applied over cable armor.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 260526.
- C. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
 - 3. Connectors for Aluminum Conductors: Use compression connectors.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 5. Aluminum Conductors: Use compression connectors for all connections.
 6. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
 - F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
 - G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
 - H. Mechanical Connectors: Provide bolted type or set-screw type.
 - I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 - J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

- A. Electrical Tape:
 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- D. Wire Pulling Lubricant:
 1. Listed and labeled as complying with UL 267.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Suitable for use at installation temperature.
- E. Cable Ties: Material and tensile strength rating suitable for application.
- F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 - 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Branch circuits shall have dedicated neutral conductors. Sharing of neutral/grounded conductors among multiple single-phase branch circuits is not permitted.
 - b. Up to three single-phase branch circuits rated not more than 30 amperes, of different phases, may be installed in a single conduit, but conductor ampacities must be derated in accordance with the NEC and other applicable codes.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 8. Provide oversized neutral/grounded conductors where indicated and as specified below.
 - a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install aluminum conductors in accordance with NECA 104.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Exposed Cable Installation (only where specifically permitted):
 - 1. Route cables parallel or perpendicular to building structural members and surfaces.
 - 2. Protect cables from physical damage.

- H. Installation in Cable Tray: Also comply with Section 260536.
- I. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- J. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
 - 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- K. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- L. Install conductors with a minimum of 12 inches of slack at each outlet.
- M. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- N. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- O. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
 - 6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- P. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- Q. Insulate ends of spare conductors using vinyl insulating electrical tape.

- R. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- S. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for conductors larger than #4 AWG. The resistance test for parallel conductors listed as optional is required.
 - 1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION 260519

**SECTION 260523
CONTROL-VOLTAGE ELECTRICAL POWER CABLES**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Category 5e twisted pair cable.
 - 2. Balanced twisted pair cable hardware.
 - 3. RS-485 cable.
 - 4. Control cable.
 - 5. Control-circuit conductors.
- B. Related Requirements:
 - 1. Section 260510 "Common Work Results for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

- A. Product Data:
 - 1. Backboards.
 - 2. Category 5e balanced twisted pair cable.
 - 3. Balanced twisted pair cable hardware.
 - 4. RS-485 cable.
 - 5. Control cable.
 - 6. Control-circuit conductors.
- B. Sustainable Design Submittals:
 - 1. Third-Party Certifications: For each product.
 - 2. Third-Party Certified Life Cycle Assessment: For each product.

1.03 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.
- B. Field quality-control reports.

1.04 REFERENCE STANDARDS

- A. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022.
- B. BICSI TDMM - Telecommunications Distribution Methods Manual, 15th Edition; 2024.
- C. ICEA S-90-661 - Category 3 and 5E Individually Unshielded Twisted Pairs, Indoor Cables (With or Without an Overall Shield) for Use in General Purpose and LAN Communication Wiring Systems; 2021.
- D. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).
- H. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
- I. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- J. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.
- K. UL 1685 - Standard for Safety Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
 - 1. Flame Travel Distance: 60 inch or less.
 - 2. Peak Optical Smoke Density: 0.5 or less.
 - 3. Average Optical Smoke Density: 0.15 or less.
- C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
- D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.02 CATEGORY 5E BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.
- B. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 5e cables.
- C. Conductors: 100 ohm, No. 24 AWG solid copper.
 - 1. Lead Content: Less than 300 parts per million.
- D. Shielding/Screening: Unshielded twisted pairs (UTP).
- E. Cable Rating: Plenum.
- F. Jacket: White thermoplastic, unless otherwise indicated.

2.03 BALANCED TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate balanced twisted pair copper communications cable.
- B. General Requirements for Balanced Twisted Pair Cable Hardware:
 - 1. Comply with the performance requirements of Category 5e.
 - 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 - 3. Cables must be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 5e. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.
- D. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
 - 1. Features:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. 24 or 48 ports.
 - 2. Construction: 16-gauge steel and mountable on 19 inch equipment racks.
 - 3. Number of Jacks per Field: One for each four-pair.
- E. Patch Cords: Factory-made, four-pair cables in 36 inch lengths; terminated with an eight-position modular plug at each end.
 - 1. Patch cords must have color-coded boots for circuit identification.
- F. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100 ohm unshielded or shielded balanced twisted pair cable.
 2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
- G. Jacks and Jack Assemblies:
1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100 ohm unshielded or shielded balanced twisted pair cable.
 2. Designed to snap-in to a patch panel or faceplate.
 3. Standards:
 - a. Category 5e, unshielded balanced twisted pair cable must comply with IEC 60603-7-2.
- H. Legend:
1. Machine printed, in the field, using adhesive-tape label.
 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.04 RS-485 CABLE

- A. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Paired, one pair, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 2. Fluorinated ethylene propylene insulation.
 3. Unshielded.
 4. Fluorinated ethylene propylene jacket.
 5. Flame Resistance: NFPA 262.

2.05 CONTROL CABLE

- A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 2. PVC insulation.
 3. Unshielded.
 4. PVC jacket.
 5. Flame Resistance: Comply with NFPA 262.

2.06 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- B. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

2.07 SOURCE QUALITY CONTROL

- A. Factory test twisted pair cables according to TIA-568-C.2.
- B. Cable will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" for raceway selection and installation requirements for conduits as supplemented or modified in this Section.

- B. Comply with requirements in Section 260533.23 "Surface Raceways for Electrical Systems" for raceway selection and installation requirements for wireways as supplemented or modified in this Section.
- C. Comply with requirements in Section 260533.16 "Boxes and Covers for Electrical Systems" for raceway selection and installation requirements for boxes as supplemented or modified in this Section.
- D. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.
- E. Install manufactured conduit sweeps and long-radius elbows if possible.
- F. Raceway Installation in Equipment Rooms:
 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
 2. Install cable trays to route cables if conduits cannot be located in these positions.
 3. Secure conduits to backboard if entering the room from overhead.
 4. Extend conduits 3 inch above finished floor.
 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.02 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 1. Comply with TIA-568-C Series of standards.
 2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
 3. Terminate all conductors; cable must not contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 4. Cables may not be spliced and must be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
 5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
 6. Secure and support cables at intervals not exceeding 48 inch and not more than 6 inch from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
 8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
 9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
 10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
 11. Support: Do not allow cables to lie on removable ceiling tiles.
 12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
 13. Provide strain relief.
 14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
 15. Ground wire must be copper, and grounding methods must comply with IEEE C2. Demonstrate ground resistance.
- C. Balanced Twisted Pair Cable Installation:
 1. Comply with TIA-568-C.2.

2. Do not untwist balanced twisted pair cables more than 1/2 inch at the point of termination to maintain cable geometry.
- D. Installation of Control-Circuit Conductors:
1. Install wiring in raceways.
 2. Use insulated spade lugs for wire and cable connection to screw terminals.
- E. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment must be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inch.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inch.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inch.
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment must be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inch.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inch.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inch.
 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures must be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inch.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inch.
 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inch.
 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inch.

3.03 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.04 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
1. Class 1 remote-control and signal circuits; No 14 AWG.
 2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.05 FIRESTOPPING

- A. Comply with requirements in Section 078413 "Penetration Firestopping."
 B. Comply with TIA-569-D, Annex A, "Firestopping."
 C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.06 GROUNDING

- A. For control-voltage wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.07 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

- B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers must use label stocks, laminating adhesives, and inks complying with UL 969.
- C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire must have a unique tag.

3.08 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.
 - a. Test instruments must meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- C. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 260523

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2025.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.
- D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 2 Ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 - 3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 - 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 5. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- G. Service-Supplied System Grounding:
 - 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.

2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H. Separately Derived System Grounding:
1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
 - b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
 - c. Generators, when neutral is switched in the transfer switch.
 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
 4. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
 5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
 6. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- I. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
 - c. Metal process piping.
 8. Provide bonding for metal building frame.
 9. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
- J. Communications Systems Grounding and Bonding:

1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - d. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.
 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
 1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.

1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
 2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.
- D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION 260526

**SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Applicable building code.
 - c. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported

- with minimum safety factor of 2.0. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 2. Comply with MFMA-4.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
 1. Exception: Lighting fixture flexible whips may be supported by ceiling grid wires where permitted.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.

2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized concrete pad 3 inches in height; see Section 033000.
 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners in accordance with manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION 260529

**SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Galvanized steel electrical metallic tubing (EMT).
- E. Rigid polyvinyl chloride (PVC) conduit.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete encasement of conduits.
- B. Section 078400 - Firestopping.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260533.16 - Boxes for Electrical Systems.
- F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
- E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2025.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- G. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
- H. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- K. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- L. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
- M. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- N. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- O. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- P. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2-inch (53 mm) trade size and larger.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 1. Under Slab on Grade: Use rigid PVC conduit.
 2. Exterior, Direct-Buried: Use rigid PVC conduit.
 3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
 4. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from underground.
 5. Where rigid polyvinyl (PVC) conduit larger than 1-1/2" trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows for bends.
 6. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches on either side of where conduit emerges.
- D. Embedded Within Concrete:
 1. Within Slab on Grade: Not permitted.
 2. Within Slab Above Ground: Not permitted.
 3. Within Concrete Walls Above Ground: Use galvanized steel electrical metallic tubing (EMT) or rigid PVC conduit.
 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT) where emerging from concrete.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC).
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
 - b. Where exposed below 20 feet in warehouse areas.
- K. Exposed, Interior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).
 - 1. Locations subject to severe physical damage include, but are not limited to:
 - a. High traffic industrial and warehouse areas where exposed below 8 feet, except within electrical and communication rooms or closets.
 - b. Where exposed below 20 feet in industrial manufacturing areas.
- L. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel electrical metallic tubing (EMT).
- M. Exposed, Exterior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).
 - 1. Exterior locations subject to severe physical damage include, but are not limited to:
 - a. Where exposed to vehicular traffic below 20 feet.
- N. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel electrical metallic tubing (EMT).
- O. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
 - 1. Maximum Length: 6 feet.
- P. Flexible Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit (FMC).
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
 - 3. Maximum Length: 6 feet unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.
- Q. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC).

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.06 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 - 4. Embedded Within Concrete, Where Permitted: Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.07 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.08 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.
- E. Sealing Systems for Concrete Penetrations:
 - 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
 - 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
- F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits

and roofing system to be installed; designed to accommodate existing penetrations where applicable.

- G. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
- H. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
- I. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for conduit/duct arrangement to be installed.
- J. Underground Warning Tape: Polyethylene tape suitable for direct burial.
 - 1. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.
 - 2. Legend: Type of service, continuously repeated over full length of tape.
 - 3. Color:
 - a. Tape for Buried Power Lines: Black text on red background.
 - b. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.
- C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.
- D. Rigid Polyvinyl Chloride (PVC) Conduit: Install in accordance with NECA 111.
- E. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route exposed conduits:
 - a. Across floors.
 - b. Across top of parapet walls.
 - c. Across building exterior surfaces.
 - 6. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 8. Arrange conduit to provide no more than equivalent of three 90-degree bends between pull points.

9. Arrange conduit to provide no more than 150 feet between pull points.
 10. Route conduits above water and drain piping where possible.
 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 14. Group parallel conduits in same area on common rack.
- F. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
 8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
 9. Use of spring steel conduit clips for support of conduits is not permitted.
 10. Use of wire for support of conduits is not permitted.
- G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
 7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 8. Secure joints and connections to provide mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.

5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.
- I. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 36 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 2. Provide underground warning tape along entire conduit length for service entrance where not concrete-encased; see Section 260553.
 3. Duct Bank Installation
 - a. Install duct to locate top of ductbank at depths as indicated on drawings.
 - b. Install power and communications ducts to locate top of ductbank minimum 36" below finished grade.
 - 1) Install medium voltage duct banks minimum 48" below finished grade.
 - c. Install duct with minimum slope of 4 inches per 100 feet (100 mm per 25.4 m) (0.33 percent). Slope duct away from building entrances.
 - d. Cut duct square using saw or pipe cutter; de-burr cut ends.
 - e. Insert duct to shoulder of fittings; fasten securely.
 - f. Join nonmetallic duct using adhesive as recommended by manufacturer.
 - g. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
 - h. Install no more than equivalent of three 90-degree bends between pull points.
 - i. Provide suitable fittings to accommodate expansion and deflection where required.
 - j. Terminate duct at handhole/manhole entries using end bell or other suitable connection. Seal connections at handholes/manholes.
 - k. Stagger duct joints vertically in concrete encasement 6 inches (150 mm) minimum.
 - l. Use suitable separators and chairs installed not greater than 4 feet (1200 mm) on centers.
 - m. Band ducts together before backfilling.
 - n. Provide suitable pull string in each empty duct except sleeves and nipples.
 - o. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
 - p. Interface installation of underground warning tape with backfilling. Install tape 6 inches (150 mm) below finished surface.
- J. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide minimum concrete cover of 3 inches on all sides unless otherwise indicated; see Section 033000.
1. Place concrete under provisions of Section 033000. Use mineral pigment to color concrete red.
 2. Securely anchor duct to prevent movement during concrete placement.
 3. Reinforcement:
 - a. Provide two No. 4 steel reinforcing bars in corners of duct banks, and at sides, tops and bottoms at intervals of 12".
 - b. Reinforcing bars shall be 1-1/2" from outer edge of encasement.
 - c. Connect with 4" x 6" wire mesh in line with reinforcing bars surrounding duct bank.
 - d. Connect to existing concrete encasement using dowels.
 - e. Connect to manhole wall using dowels.

- K. Where 4 or more conduits, grouped together, emerge from underground to penetrate slab on grade, provide a minimum of 3 inch high housekeeping pad, with minimum concrete cover of 3 inches on all sides, unless otherwise indicate; see Section 0333000.
- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 - 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 - 3. Where conduits are subject to earth movement by settlement or frost.
- M. Conduit Sealing:
 - 1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
 - 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide grounding and bonding; see Section 260526.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 260533.13

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Boxes and enclosures for integrated power, data, and audio/video.
- D. Floor boxes.
- E. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

- A. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 262726 - Wiring Devices:
 - 1. Wall plates.
 - 2. Floor box service fittings.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, floor boxes, and underground boxes/enclosures.
 1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
- C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.
 2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use cast iron boxes where exposed galvanized steel rigid metal conduit is used.
 4. Use suitable concrete type boxes where flush-mounted in concrete.
 5. Use suitable masonry type boxes where flush-mounted in masonry walls.
 6. Use raised covers suitable for the type of wall construction and device configuration where required.

7. Use shallow boxes where required by the type of wall construction.
 8. Do not use "through-wall" boxes designed for access from both sides of wall.
 9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 13. Wall Plates: Comply with Section 262726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.
- E. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 262726; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
 2. Use cast iron floor boxes within slab on grade.
 3. Use sheet-steel or cast iron floor boxes within slab above grade.
 4. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
 5. Manufacturer: Same as manufacturer of floor box service fittings.
- F. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 2. Size: As indicated on drawings.
 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
 4. Applications:
 - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
 - b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
 - c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
 - a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 - 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
 - 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
 - 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
- E. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- H. Install boxes as required to preserve insulation integrity.
 - I. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
 - J. Underground Boxes/Enclosures:
 1. Install enclosure on gravel base, minimum 6 inches deep.
 2. Flush-mount enclosures located in concrete or paved areas.
 3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
 4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
 - K. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
 - L. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
 - M. Close unused box openings.
 - N. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
 - O. Provide grounding and bonding in accordance with Section 260526.
 - P. Identify boxes in accordance with Section 260553.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION 260533.16

**SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Floor marking tape.
- F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 099113 - Exterior Painting.
- B. Section 099123 - Interior Painting.
- C. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 260573 - Power System Studies: Arc flash hazard warning labels.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Switchgear:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Use identification nameplate to identify main and tie devices.
 - 4) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - b. Switchboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify main overcurrent protective device.
 - 5) Use identification label to identify load(s) served for each branch device. Identify spares and spaces.
 - c. Motor Control Centers:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify main overcurrent protective device.
 - 5) Use identification nameplate or identification label to identify load(s) served for each branch device. Do not identify spares and spaces.
 - d. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify main overcurrent protective device. Use identification nameplate for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
 - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.
 - e. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify load(s) served. Include location when not within sight of equipment.
 - f. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - g. Busway:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Provide identification at maximum intervals of 40 feet.
 - 4) Use identification nameplate to identify load(s) served for each plug-in unit. Include location when not within sight of equipment.

- h. Enclosed Contactors:
 - 1) Identify voltage and phase.
 - 2) Identify coil voltage.
 - i. Centralized Emergency Lighting Inverters:
 - 1) Identify input and output voltage and phase.
 - 2) Identify power source and circuit number for normal power source. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location.
 - j. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - 4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
 3. Emergency System Equipment:
 - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
 - b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
 - c. Use identification nameplate to identify emergency operating instructions for emergency system equipment.
 4. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
 5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
 6. Use identification label on inside of door at each fused switch to identify required NEMA fuse class and size.
 7. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
 8. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
 - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 099123 and 099113.
 9. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
 10. Arc Flash Hazard Warning Labels: Comply with Section 260573.
 11. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with

the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.

- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
 - b. Within boxes when more than one circuit is present.
 - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
- C. Identification for Cabinets and Miscellaneous Equipment Enclosures
 - 1. Use identification labels to identify enclosed equipment, supplying panel and circuit number(where applicable).
- D. Identification for Boxes:
 - 1. Use identification labels to identify circuits enclosed.
 - 2. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
- E. Identification for Devices:
 - 1. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
 - a. Labels shall be white with red lettering unless otherwise noted.
 - 2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - 3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
 - 4. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic or stainless steel nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

- C. Format for Equipment Identification:
 - 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend:
 - a. System designation where applicable:
 - 1) Emergency Power System: Identify with text "EMERGENCY".
 - 2) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height:
 - a. System Designation: 1 inch.
 - b. Equipment Designation: 1/2 inch.
 - 5. Color:
 - a. Normal Power System: White text on black background.
 - b. Emergency Power System: White text on Orange background.
 - c. Fire Alarm System: White text on red background.
- D. Format for Caution and Warning Messages:
 - 1. Minimum Size: 2 inches by 4 inches.
 - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 1/2 inch.
 - 5. Color: Black text on yellow background unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
 - 1. Do not use handwritten text.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B. Minimum Size:
 - 1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
- C. Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
 - 2. Markers for System Identification:
 - a. Emergency Power System: Text "EMERGENCY".
- D. Color: Black text on orange background unless otherwise indicated.

2.05 FLOOR MARKING TAPE

- A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlamine, 3 inches wide, with alternating black and white stripes.

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

- B. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conduits: Legible from the floor.
 - 8. Boxes: Outside face of cover.
 - 9. Conductors and Cables: Legible from the point of access.
 - 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 260553

**SECTION 260573
POWER SYSTEM STUDIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Short-circuit study.
- B. Protective device coordination study.
- C. Arc flash and shock risk assessment.
 - 1. Includes arc flash hazard warning labels.
- D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.02 RELATED REQUIREMENTS

- A. Section 260553 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.

1.03 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 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001, with Errata (2003).
- D. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.
- E. IEEE 551 - IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems; 2006.
- F. IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations; 2018, with Errata (2019).
- G. NEMA MG 00001 - Motors and Generators; 2024.
- H. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.
 - 2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Submit study reports prior to or concurrent with product submittals.
 - 2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Study preparer's qualifications.
- C. Study reports, signed and sealed and signed by study preparer.

- D. Arc Flash Hazard Warning Label Samples: One of each type and legend specified.
- E. Certification that field adjustable protective devices have been set in accordance with requirements of studies.
- F. Project Record Documents: Revise studies as required to reflect as-built conditions.
 - 1. Include hard copies with operation and maintenance data submittals.
 - 2. Include computer software files used to prepare studies with file name(s) cross-referenced to specific pieces of equipment and systems.

1.06 POWER SYSTEM STUDIES

- A. Scope of Studies:
 - 1. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
 - 2. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.
- B. General Study Requirements:
 - 1. Comply with NFPA 70.
 - 2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.
- C. Data Collection:
 - 1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
 - a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
 - 1) Obtain up-to-date information from Utility Company.
 - b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.
 - c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 00001 code letter designation.
 - d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
 - e. Protective Devices:
 - 1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
 - 2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
 - f. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
 - g. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.
- D. Short-Circuit Study:
 - 1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
 - 2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
 - a. Maximum utility fault currents.
 - b. Maximum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).

3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.
- E. Protective Device Coordination Study:
1. Comply with applicable portions of IEEE 242 and IEEE 399.
 2. Analyze alternate scenarios considering known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
 3. Analyze protective devices and associated settings for suitable margins between time-current curves to provide adequate protection for equipment and conductors while achieving full selective coordination.
- F. Arc Flash and Shock Risk Assessment:
1. Comply with NFPA 70E.
 2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
 - a. Where reasonable, study preparer may assume a maximum clearing time of two seconds in accordance with IEEE 1584, provided that the conditions are such that a worker's egress from an arc flash event would not be inhibited.
 - b. For single-phase systems, study preparer to perform calculations assuming three-phase system in accordance with IEEE 1584 using single phase bolted fault current, yielding conservative results.
 3. For equipment with main devices mounted in separate compartmentalized sections, perform calculations on both the line and load side of the main device.
 4. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
 - a. Maximum and minimum utility fault currents.
 - b. Maximum and minimum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
- G. Study Reports:
1. General Requirements:
 - a. Identify date of study and study preparer.
 - b. Identify study methodology and software product(s) used.
 - c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
 - d. Identify base used for per unit values.
 - e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
 - f. Include conclusions and recommendations.
 2. Short-Circuit Study:
 - a. For each scenario, identify at each bus location:
 - 1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
 - 2) Fault point X/R ratio.
 - 3) Associated equipment short circuit current ratings.
 - b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
 3. Protective Device Coordination Study:
 - a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
 - b. For each graph include (where applicable):
 - 1) Partial single-line diagram identifying the portion of the system illustrated.

- 2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
 - 3) Conductors: Damage curves.
 - 4) Transformers: Inrush points and damage curves.
 - 5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
 - 6) Motors: Full load current, starting curves, and damage curves.
 - 7) Capacitors: Full load current and damage curves.
 - c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
 - 1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
 - 2) Include ground fault pickup and delay.
 - 3) Include fuse ratings.
 - 4) Protective Relays: Include current/potential transformer ratios, tap, time dial, and instantaneous pickup.
 - d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.
4. Arc Flash and Shock Risk Assessment:
- a. For the worst case for each scenario, identify at each bus location:
 - 1) Calculated incident energy and associated working distance.
 - 2) Calculated arc flash boundary.
 - 3) Bolted fault current.
 - 4) Arcing fault current.
 - 5) Clearing time.
 - 6) Arc gap distance.
 - b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.
 - c. Include recommendations for reducing the incident energy at locations where the calculated maximum incident energy exceeds 8 calories per sq cm.

1.07 QUALITY ASSURANCE

- A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in preparation of studies of similar type and complexity using specified computer software.
 1. Study preparer may be employed by manufacturer of electrical distribution equipment.
- B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

PART 2 PRODUCTS

2.01 ARC FLASH HAZARD WARNING LABELS

- A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
 1. Materials: Comply with Section 260553.
 2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
 - a. Include the text "Arc Flash and Shock Hazard; Appropriate PPE Required" or approved equivalent.
 - b. Include the following information:
 - 1) Arc flash boundary.
 - 2) Available incident energy and corresponding working distance.
 - 3) Nominal system voltage.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install arc flash warning labels in accordance with Section 260553.

3.02 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Adjust equipment and protective devices for compliance with studies and recommended settings.
- D. Notify Architect of any conflicts with or deviations from studies. Obtain direction before proceeding.

END OF SECTION 260573

**SECTION 260945
NETWORK LIGHTING CONTROLS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 RELATED REQUIREMENTS

- A. System components shall comply with UL 916 and UL 924 as applicable.
- B. System shall be installed in accordance with NFPA 70.

1.03 SUMMARY

- A. Section Includes: Networked lighting control system comprised of system interfaces, system controller, digital time clock, networked control devices, and communication interfaces.

1.04 DEFINITIONS

- A. DDC: Direct digital control.
- B. IP: Internet protocol.
- C. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

1.05 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each relay panel and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail wiring partition configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of relays.
 - 5. Address Drawing: Reflected ceiling plan and floor plans, showing connected luminaires, address for each luminaire, and luminaire groups. Base plans on construction plans, using the same legend, symbols, and schedules.
 - 6. Point List and Data Bus Load: Summary list of all control devices, sensors, ballasts, and other loads. Include percentage of rated connected load and device addresses.
 - 7. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
 - 8. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

1.06 QUALITY ASSURANCE

- A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems

1. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.
 2. For networked controls, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the network protocol.
- B. Field quality-control reports.
- C. Sample Warranty: For manufacturer's special warranty.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.
- B. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
 2. Program Software Backup: On USB drive.
 3. Device address list.

1.08 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lighting Control Relays: Equal to 10 percent of amount installed for each size indicated, but no fewer than 4.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Handle and prepare panels for installation according to NECA 407.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of standalone multipreset modular dimming controls that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Damage from transient voltage surges.
 2. Warranty Period: Cost to repair or replace any parts for two years from date of Substantial Completion.
 3. Extended Warranty Period: Cost of replacement parts (materials only, f.o.b. the nearest shipping point to Project site), for five years, that failed in service due to transient voltage surges.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. General Operation: Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels, or shall operate power packs or fixture-integrated control modules. Any combination of inputs shall be programmable to any number of control relays, power packs, or control modules. Dimming signals (0-10V) from field-mounted dimmer switches, or digital signal sources, shall operate dimmer modules in dimming relay panels, or shall dim fixtures with integral dimming control modules.
- B. Surge Protective Device: Factory installed as an integral part of control components or field-mounted surge suppressors complying with UL 1449, SPD Type 2.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.
- E. Comply with UL 916.

2.02 SEQUENCE OF OPERATIONS

A. Control Zones

1. Networked luminaires and intelligent lighting control devices installed in an area (also referred to as a group of devices) shall be capable of transmitting and tracking occupancy sensor, photocell sensor, and manual switch information within at least 48 unique control zones to support different and reconfigurable sequences of operation within the area. These shall also be referred to as local control zones.
2. Networked luminaires and intelligent lighting control devices shall include the ability to track occupancy broadcasts from adjacent zones. When this feature is enabled, luminaire output for a vacant zone will reduce to a configurable dimmed state if one or more adjacent zones are occupied. Luminaires will turn off when both primary and adjacent zones are vacant.

B. Wall Stations

1. Wall stations shall be provided to support the following capabilities:
 - a. On/Off of a local control zone.
 - b. Continuous dimming control of light level of a local control zone.
 - c. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local control zones, so as to support "multi-way" switching and/or dimming control.

C. Occupancy Sensors

1. Occupancy sensors shall be configurable to control a local zone.
2. Multiple occupancy sensors shall be capable of controlling the same local zones. This capability combines occupancy sensing coverage from multiple sensors without consuming multiple control zones.
3. System shall support the following types of occupancy sensing sequence of operations:
 - a. On/Off Occupancy Sensing
 - b. Partial-On Occupancy Sensing
 - c. Partial-Off Occupancy Sensing
 - d. Vacancy Sensing (Manual-On / Automatic-Off)
4. On/Off, Partial-On, and Partial-Off Occupancy Sensing modes shall function according to the following sequence of operation:
 - a. Occupancy sensors shall automatically turn lights on to a designated level when occupancy is detected. To support fine tuning of Partial-On sequences the designated occupied light level shall support at least 100 dimming levels.
 - b. Occupancy sensors shall automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. To support fine tuning of Partial-Off sequences the designated unoccupied dim level shall support at least 100 dimming levels.
 - c. To provide additional energy savings the system shall also be capable of combining Partial-Off and Full-Off operation by dimming the lights to a designated level when vacant and then turning the lights off completely after an additional amount of time.
 - d. Photocell readings, if enabled in the Occupancy Sensing control zone, shall be capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary to further reduce energy usage. Additional requirements and details for photocell sensing capabilities are indicated under Photocell Sensing Capabilities.
 - e. The use of a wall station shall change the dimming level or turn lights off as selected by the occupant. The lights shall optionally remain in this manually-specified light level until the zone becomes vacant; upon vacancy the normal sequence of operation, as defined above, shall proceed.
5. Vacancy Sensing mode (also referred to as Manual-On / Automatic-Off) shall function according to the following sequence of operation:

- a. The use of a wall station is required turn lights on. The system shall be capable of programming the zone to turn on to either to a designated light level or the previous user light level. Initially occupying the space without using a wall station shall not result in lights turning on.
 - b. To provide additional energy savings and an enhanced occupant experience, the system shall also be capable of dimming the lights when vacant and then turning the lights off completely after an additional amount of time.
 - c. To minimize occupant impact in case the area or zone is still physically occupied following dimming or shutoff of the lights due to detection of vacancy, the system shall support an "automatic grace period" immediately following detection of vacancy, during which time any detected occupancy shall result in the lights reverting to the previous level. After the grace period has expired, the use of a wall station is required to turn lights on.
 - d. Photocell readings, if enabled in the Occupancy Sensing control zone, shall be capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary to further reduce energy usage. Additional requirements and details for photocell sensing capabilities are indicated under Photocell Sensing Capabilities.
 - e. At any time, the use of a wall station shall change the dimming level or turn lights off as selected by the occupant. The lights shall optionally remain in this manually-specified light level until the zone becomes vacant; upon vacancy the normal sequence of operation, as defined above, shall proceed.
6. To accommodate diverse types of environments, occupancy time delays before dimming or shutting off lights shall be specifiable for control zones between 15 seconds to 2 hours.

D. Photocell Sensors

- 1. Photocell sensing devices shall be configurable to control a local zone.
- 2. The system shall support the following type of photocell-based control:
 - a. Continuous Dimming: The control zone automatically adjusts its dimming output in response to photocell readings, such that a minimum light level consisting of both electric light and daylight sources is maintained at the task. The photocell response shall be configurable to adjust the photocell setpoint and dimming rates.

E. Scheduling

- 1. System shall support the creation of time schedules for time-of-day override of devices including offsets from dusk and dawn.
- 2. System shall support blink warning and timed extension capabilities.
 - a. The system shall be capable of providing a visible "blink warning" 5 minutes prior to the end of the schedule.
 - b. Timed override/extension duration shall be programmable for each individual device, zone of devices, or customized group of devices, ranging from 5 minutes to 12 hours.

F. Global Profiles

- 1. The system shall be capable of automatically modifying the sequence of operation for selected devices in response to any of the following: a time-of-day schedule, contact closure input state, manually triggered wired wall station input, RS-232/RS-485 command to wired input device, and BACnet input command. This capability is defined as supporting "Global Profiles" and is used to dynamically optimize the occupant experience and lighting energy usage.
- 2. Global profiles may be scheduled with the following capabilities:
 - a. Global Profiles shall be stored within and executed from the system controller (via internal timeclock) such that a dedicated software host or server is not required to be online to support automatic scheduling and/or operation of Global Profiles.
 - b. Global Profile time-of-day schedules shall be capable of being given the following recurrence settings: daily, specific days of week, every "n" number of days, weekly, monthly, and yearly. Lighting control profile schedules shall support definition of start

- date, end date, end after “n” recurrences, or never ending. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
- c. Global Profile Holiday Schedules should follow recurrent settings for specific US holiday dates regardless if they always occur on a specific date or are determined by the day/week of the month.
 - d. Global Profiles shall be capable of being scheduled to run according to timed offsets relative to sunrise or sunset. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
 - e. Software management interface shall be capable of displaying a graphic calendar view of profile schedules for each control zone.
3. A backup of Local and Global Profiles shall be stored on the software's host server such that the Profile backup can be applied to a replacement system controller or wired wall station.

2.03 SYSTEM SOFTWARE INTERFACES

- A. Management Interface
 1. System shall provide a web-based management interface that provides remote system control, live status monitoring, and configuration capabilities of lighting control settings and schedules.
 2. Management interface must be compatible with industry-standard web browser clients, including, but not limited to, Microsoft Internet Explorer®, Apple Safari®, Google Chrome®.
 3. Management interface shall require all users to login with a User Name and Password, and shall support creation of at least 100 unique user accounts.
 4. Management interface shall support at least three permission levels for users: read-only, read & change settings, and full administrative system access.
 5. Management interface shall be capable of restricting access for user accounts to specific devices within the system.
 6. All system devices shall be capable of being given user-defined names.
 - a. Management interface shall be able to read the live status of a networked luminaire or intelligent control device and shall be capable of displaying luminaire on/off status, dim level, power measurement, device temperature, PIR occupancy sensor status, microphonic occupancy sensor status, remaining occupancy time delay, photocell reading, and active Profiles.
 - b. Management interface shall be able to read the current active settings of a networked luminaire or intelligent control device and shall be capable of displaying dimming trim levels, occupancy sensor and photocell enable/disable, occupancy sensor time delay and light level settings, occupancy sensor response (normal or vacancy), and photocell setpoints and transition time delays.
 - c. Management interface shall be able to change the current active settings and default settings for an individual networked luminaire or intelligent control device.

2.04 WIRED NETWORKED CONTROL ZONE CHARACTERISTICS

- A. Connections to devices within a wired networked lighting control zone and to backbone components shall be with a single type of low voltage network cable, which shall be compliant with CAT5e specifications or higher. To prevent wiring errors and provide cost savings, the use of mixed types of low voltage network cables shall not be permitted.
 1. Following proper installation and provision of power, all networked devices connected with low voltage network cable shall automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g. software application, handheld remote, pushbutton).
 2. Once software is installed, system shall be able to automatically discover all connected devices without requiring any provisioning of system or zone addresses.
 3. All networked devices shall have the ability to detect improper communication wiring and blink its LED in a specific cadence as to alert installation/startup personnel.

2.05 WIRED NETWORKED DEVICES

- A. Wired Networked Wall Switches, Dimmers, Scene Controllers
 - 1. Devices shall recess into single-gang switch box and fit a standard GFI opening.
 - 2. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
 - 3. Wall switches & dimmers shall support the following device options:
 - a. Number of control zones: 1, 2 or 4
 - b. Control Types Supported: On/Off, On/Off/Dimming
 - 4. Scene controllers shall support the following device options:
 - a. Number of scenes: 1, 2 or 4
 - b. Control Types Supported: On/Off, On/Off/Dimming, Preset Level Scene
- B. Wired Networked Occupancy and Photosensors
 - 1. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
 - 2. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
 - 3. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional "dual" technology shall be used.
 - 4. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
 - 5. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers and hearing devices). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonic technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.
 - 6. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
 - 7. Photosensor and dimming sensor's set-point and dead band shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered and/or modified.
 - 8. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The secondary daylight zone shall be capable of being controlled as an "offset" from the primary zone.
- C. Wired Networked Wall Switch Sensors
 - 1. Devices shall recess into single-gang switch box and fit a standard GFI opening.
 - 2. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
 - 3. All wall switch sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.
 - 4. Wall switch sensors shall support the following device options:
 - a. User Input Control Types Supported: On/Off or On/Off/Dimming
 - b. Occupancy Sensing Technology: PIR only or Dual Tech acoustic
 - c. Daylight Sensing Option: Inhibit Photosensor
- D. Wired Networked Power Packs and Secondary Packs
 - 1. Power Packs shall incorporate one optional Class 1 relay, optional 0-10 VDC dimming output, and contribute low voltage Class 2 power to the rest of the system.

2. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC) and carry a plenum rating.
3. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power.
4. Power Supplies shall provide system power only, but are not required to switch line voltage circuit.
5. Communication shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors. Secondary packs shall receive low voltage power via standard low voltage network cable.
6. Power Pack programming parameters shall be available and configurable remotely from the software and locally via the device push-button.
7. Power Pack shall securely mount through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast/driver channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
8. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.

2.06 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 EXECUTION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store panels according to NECA 407.
- B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
- C. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

3.03 PANEL INSTALLATION

- A. Comply with NECA 1.
- B. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- C. Mount panel cabinet plumb and rigid without distortion of box.
- D. Install filler plates in unused spaces.

3.04 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- B. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

- C. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.05 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.06 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.07 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.08 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface.

END OF SECTION 260945

**SECTION 262416
PANELBOARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260548 - Vibration and Seismic Controls for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- G. Section 262200 - Low-Voltage Transformers: Small power centers with integral primary breaker, transformer, and panelboard.
- H. Section 264300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2025.
- D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000V or Less; 2023.
- G. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- O. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.
- P. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Identify mounting conditions required for equipment seismic qualification.
- D. Manufacturer's equipment seismic qualification certification.
- E. Field Quality Control Test Reports.
- F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric: www.se.com/#sle.
- D. Siemens Industry, Inc: www.new.siemens.com/#sle.
- E. Source Limitations: Provide panelboards and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
 - 2. Listed series ratings are not acceptable.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide 200 percent rated neutral bus and lugs where indicated, where oversized neutral conductors are provided, or where panelboards are fed from K-rated transformers.
 - 3. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 - c. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.

- b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
- 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 264300, list and label panelboards as a complete assembly including surge protective device.
- L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 - 1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
- M. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.
- N. Load centers are not acceptable.
- O. Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Feed-through lugs.
 - 2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
 - 1. Designation: Panelboards with mains ratings in excess of 400 amperes shall be considered Power Distribution Panelboards, unless otherwise indicated.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
 - a. Provide compression lugs for panelboards with mains ratings in excess of 800 amperes.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Tin-plated copper.
 - 2. Ground Bus Material: Tin-plated copper.
- D. Circuit Breakers:
 - 1. Provide bolt-on type.
 - 2. Circuit breaker mounting provisions: panelboards shall be selected such that branch circuit breakers rated at one-third the mains rating of the panel can be installed without modification of the bussing, requiring sub-feed or other special adapter kits, or other modifications that reduce the indicated available circuit count of the panelboard. Where one-third of the mains rating does not correspond to a standard circuit breaker rating, the next larger standard circuit breaker rating shall be used for this requirement.
 - 3. Provide thermal magnetic circuit breakers unless otherwise indicated.
 - 4. Provide electronic trip circuit breakers where indicated.
- E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.

2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Aluminum or copper.
 3. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 14,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 - b. Provide interchangeable trip units where indicated.
 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - a. Provide the following field-adjustable trip response settings:
 - 1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - 2) Long time delay.

- 3) Short time pickup and delay.
- 4) Instantaneous pickup.
- 5) Ground fault pickup and delay where ground fault protection is indicated.
6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
7. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
 - d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
8. Provide listed switching duty rated circuit breakers with SWD marking for lighting circuits and where indicated.
9. Do not use tandem circuit breakers.
10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
12. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 260529.
- F. Provide required seismic controls in accordance with Section 260548.
- G. Install panelboards plumb.
- H. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- I. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- J. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
- K. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- L. Provide grounding and bonding in accordance with Section 260526.

- M. Install all field-installed branch devices, components, and accessories.
- N. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- O. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- P. Set field-adjustable circuit breaker tripping function settings as indicated.
- Q. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- R. Provide filler plates to cover unused spaces in panelboards.
- S. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 - 1. Emergency and night lighting circuits.
 - 2. Fire detection and alarm circuits.
 - 3. Intrusion detection and access control system circuits.
 - 4. Video surveillance system circuits.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 200 amperes. Tests listed as optional are not required.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E. Test GFCI circuit breakers to verify proper operation.
- F. Test AFCI circuit breakers to verify proper operation.
- G. Test shunt trips to verify proper operation.
- H. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 262416

SECTION 262726 WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates and covers.
- D. Floor box service fittings.

1.02 RELATED REQUIREMENTS

- A. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- L. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
 - 6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
 - 1. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR) for each protection mode, and diagnostics information.
- C. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.
- D. Project Record Documents: Record actual installed locations of wiring devices.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Plates: One of each style, size, and finish.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICES - GENERAL REQUIREMENTS

- A. Provide wiring devices suitable for intended use with ratings adequate for load served.

2.02 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.03 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 - 2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

- D. Surge Protection Receptacles:
 - 1. Surge Protection Receptacles - General Requirements: Listed and labeled as complying with UL 1449, Type 2 or 3.
 - a. Energy Dissipation: Not less than 240 J per mode.
 - b. Protected Modes: L-N, L-G, N-G.
 - c. UL 1449 Voltage Protection Rating (VPR): Not more than 700 V for L-N, L-G modes and 1200 V for N-G mode.
 - d. Diagnostics:
 - 1) Visual Notification: Provide indicator light to report functional status of surge protection.
 - 2. Standard Surge Protection Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
- E. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.
 - 1. Standard Locking Convenience Receptacles: Single, 20A, 125V, NEMA L5-20R.

2.04 WALL PLATES AND COVERS

- A. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard; _____.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Weatherproof Receptacle Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- C. Weatherproof Receptacle Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.
- D. Weatherproof Switch Covers for Wet or Damp Locations: Gasketed, metallic, with externally operable actuating means and corrosion-resistant screws; listed as suitable for use in wet locations.

2.05 FLOOR BOX SERVICE FITTINGS

- A. Description: Service fittings compatible with floor boxes provided under Section 260533.16 with components, adapters, and trims required for complete installation.
- B. Flush Floor Service Fittings:
 - 1. Single Service Flush Convenience Receptacles:
 - a. Cover: Rectangular.
 - b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2. Single Service Flush Communications Outlets:
 - a. Cover: Rectangular.
 - b. Configuration: _____.
 - c. Voice and Data Jacks: Provided by others.
 - 3. Dual Service Flush Combination Outlets:
 - a. Cover: Rectangular.
 - b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2) Communications: _____.
 - 3) Voice and Data Jacks: Provided by others.
 - 4. Dual Service Flush Furniture Feed:
 - a. Cover: Rectangular.
 - b. Configuration:

- 1) Power: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
 - 2) Communications: One 2-1/8 inch by 1 inch combination threaded opening(s).
5. Accessories:
- a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
 - b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G. Verify that core drilled holes for poke-through assemblies are in proper locations.
- H. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
 1. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 2. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.

- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Inspect each surge protection receptacle to verify surge protection is active.
- G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 262726

**SECTION 262813
FUSES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 RELATED REQUIREMENTS

- A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 262816.16 - Enclosed Switches: Fusible switches.

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-4 - Low-Voltage Fuses - Part 4: Class CC Fuses; Current Edition, Including All Revisions.
- E. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.
- F. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - a. Fusible Enclosed Switches: See Section 262816.16.
 - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Service Entrance:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. Feeders:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- C. General Purpose Branch Circuits: Class RK1, time-delay.
- D. Individual Motor Branch Circuits: Class RK5, time-delay.

- E. In-Line Protection for Pole-Mounted Luminaires: Class CC, time-delay.
- F. Primary Protection for Control Transformers: Class CC, time-delay.

2.02 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
- H. Class L Fuses: Comply with UL 248-10.
- I. Class CC Fuses: Comply with UL 248-4.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION 262813

**SECTION 262816.13
ENCLOSED CIRCUIT BREAKERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed circuit breakers.

1.02 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- J. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
 - 1. Include characteristic trip curves for each type and rating of circuit breaker upon request.

- C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Project Record Documents: Record actual installed locations of enclosed circuit breakers.
- E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed circuit breaker internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature between 23 degrees F and 104 degrees F during and after installation of enclosed circuit breakers.

PART 2 PRODUCTS

2.01 ENCLOSED CIRCUIT BREAKERS

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between 23 degrees F and 104 degrees F.
- D. Short Circuit Current Rating:
 - 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
 - 2. Listed series ratings are not acceptable.
- E. Enclosed Circuit Breakers Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- F. Conductor Terminations: Suitable for use with the conductors to be installed.
- G. Provide thermal magnetic circuit breakers unless otherwise indicated.
- H. Provide electronic trip circuit breakers where indicated.
- I. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- J. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- K. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

3. Provide surface-mounted enclosures unless otherwise indicated.
- L. Provide externally operable handle with means for locking in the OFF position.
- M. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
- N. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

2.02 MOLDED CASE CIRCUIT BREAKERS

- A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
- B. Interrupting Capacity:
 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - b. 14,000 rms symmetrical amperes at 480 VAC.
 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C. Conductor Terminations:
 1. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
- D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
- E. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 1. Provide the following field-adjustable trip response settings:
 - a. Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - b. Long time delay.
 - c. Short time pickup and delay.
 - d. Instantaneous pickup.
 - e. Ground fault pickup and delay where ground fault protection is indicated.
- F. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
- G. Provide the following features and accessories where indicated or where required to complete installation:
 1. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed circuit breakers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).

- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed circuit breakers plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 260526.
- H. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- I. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 260573.
- J. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- K. Identify enclosed circuit breakers in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers used for service entrance and for circuit breakers larger than 200 amperes. Tests listed as optional are not required.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E. Test shunt trips to verify proper operation.
- F. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from circuit breaker enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 262816.13

**SECTION 262816.16
ENCLOSED SWITCHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Shop Drawings for switches rated 800A or more: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of enclosed switches and adjacent equipment with all required clearances indicated.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
- K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- L. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- N. Heavy Duty Switches:
 - 1. Comply with NEMA BS 31047.
 - 2. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Provide compression lugs for switch ratings 800 amperes and above.
 - c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
- O. Provide the following features and accessories where indicated or where required to complete installation:
 1. Hubs: As required for environment type; sized to accept conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 260526.
- H. Provide fuses complying with Section 262813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 262816.16

**SECTION 262913
ENCLOSED CONTROLLERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed NEMA controllers for low-voltage (600 V and less) applications:
 - 1. Magnetic motor starters.
 - 2. General purpose contactors.
 - 3. Manual motor starters.
- B. Overcurrent protective devices for motor controllers, including overload relays.
- C. Control accessories:
 - 1. Auxiliary contacts.
 - 2. Pilot devices.
 - 3. Control and timing relays.
 - 4. Control power transformers.
 - 5. Control terminal blocks.

1.02 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.03 REFERENCE STANDARDS

- A. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers; 2016.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
- E. NEMA IA 10039 - Control Circuit and Pilot Devices; 2025.
- F. NEMA IA 10030 - Industrial Control and Systems: Enclosures; 2024.
- G. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- J. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules; Current Edition, Including All Revisions.
- K. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.

2. Coordinate the work to provide motor controllers and associated overload relays suitable for use with the actual motors to be installed.
3. Coordinate the work to provide controllers and associated wiring suitable for interface with control devices to be installed.
4. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
5. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
6. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for motor controllers, enclosures, overcurrent protective devices, and other installed components and accessories.
 1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- C. Shop Drawings: Indicate dimensions, voltage, controller sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Field Quality Control Test Reports.
- E. Project Record Documents: Record actual installed locations of controllers and final equipment settings.
 1. Include nameplate data of actual installed motors and associated overload relay selections and settings.
 2. Motor Circuit Protectors: Include magnetic instantaneous trip settings.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within required service conditions during and after installation.

PART 2 PRODUCTS

2.01 ENCLOSED CONTROLLERS

- A. Provide enclosed controller assemblies consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Enclosed controllers complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; ratings, configurations and features as indicated on the drawings.
- D. Service Conditions:
 1. Provide controllers and associated components suitable for operation under the following service conditions without derating:

- a. Altitude:
 - 1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet.
 - 2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet.
 - b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
 - 2. Provide controllers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- E. Short Circuit Current Rating:
- 1. Provide controllers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
 - 2. Listed series ratings are not acceptable.
- F. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures:
- 1. Comply with NEMA IA 10030.
 - 2. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 - b. Outdoor Locations: Type 3R or Type 4.
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- I. Instrument Transformers:
- 1. Comply with IEEE C57.13.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers: Connect secondaries to shorting terminal blocks.
 - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.
- J. Magnetic Motor Starters: Combination type unless otherwise indicated.
- 1. Combination Magnetic Motor Starters: NEMA ICS 2, Class A combination motor controllers with magnetic contactor(s), externally operable disconnect and overload relay(s).
 - 2. Configuration: Full-voltage non-reversing unless otherwise indicated.
 - 3. Disconnects: Circuit breaker type.
 - a. Circuit Breakers: Motor circuit protectors (magnetic-only) unless otherwise indicated or required.
 - b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
 - c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
 - 4. Overload Relays: Solid-state type unless otherwise indicated.
 - 5. Pilot Devices Required:
 - a. Furnish local pilot devices for each unit as specified below unless otherwise indicated on drawings.
 - b. Single-Speed, Non-Reversing Starters:
 - 1) Pushbuttons: START-STOP.
 - 2) Selector Switches: HAND/OFF/AUTO.
 - 3) Indicating Lights: Red ON, Green OFF.
 - c. Single-Speed, Reversing Starters:
 - 1) Pushbuttons: FOR-REV-STOP.
 - 2) Selector Switches: FOR/OFF/REV.

- 3) Indicating Lights: Red FOR, Red REV, Green OFF.
- K. General Purpose Contactors: Combination or noncombination type as indicated.
 - 1. Combination Contactors: NEMA ICS 2, Class A combination controllers with magnetic contactor(s) and externally operable disconnect, but without integral overload relay(s).
 - 2. Noncombination Contactors: NEMA ICS 2, Class A noncombination motor controllers with magnetic contactor(s), but without integral overload relay(s).
 - 3. Configuration: Full-voltage non-reversing unless otherwise indicated.
 - 4. Disconnects: Circuit breaker type.
 - a. Circuit Breakers: Thermal magnetic unless otherwise indicated or required.
 - b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
 - c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
- L. Manual Motor Starters:
 - 1. Description: NEMA ICS 2, Class A manually-operated motor controllers with overload relay(s).
 - 2. Configuration: Non-reversing unless otherwise indicated.
 - 3. Fractional-Horsepower Manual Motor Starters:
 - a. Furnish with toggle operator.
 - b. Overload Relays: Bimetallic or melting alloy thermal type.

2.02 OVERCURRENT PROTECTIVE DEVICES

- A. Overload Relays:
 - 1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
 - 2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
 - 3. Trip-free operation.
 - 4. Visible trip indication.
 - 5. Resettable.
 - a. Employ manual reset unless otherwise indicated.
 - b. Do not employ automatic reset with two-wire control.
 - 6. Bimetallic Thermal Overload Relays:
 - a. Interchangeable current elements/heaters.
 - b. Adjustable trip; plus/minus 10 percent of nominal, minimum.
 - c. Trip test function.
 - 7. Melting Alloy Thermal Overload Relays:
 - a. Interchangeable current elements/heaters.
 - 8. Solid-State Overload Relays:
 - a. Adjustable full load current.
 - b. Phase loss protection.
 - c. Phase imbalance protection.
 - d. Ambient temperature insensitive.
 - e. Thermal memory.
 - f. Trip test function.
 - g. Provide isolated alarm contact.
- B. Circuit Breakers:
 - 1. Interrupting Capacity (not applicable to motor circuit protectors):
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.

- b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- 2. Motor Circuit Protectors:
 - a. Description: Instantaneous-trip circuit breakers furnished with magnetic instantaneous tripping elements for short circuit protection, but not with thermal inverse time tripping elements for overload protection; UL 489 recognized only for use as part of a listed combination motor controller with overload protection; ratings, configurations, and features as indicated on the drawings.
 - b. Provide field-adjustable magnetic instantaneous trip setting.

2.03 CONTROL ACCESSORIES

- A. Auxiliary Contacts:
 - 1. Comply with NEMA IA 10039.
 - 2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each magnetic motor starter, minimum.
- B. Pilot Devices:
 - 1. Comply with NEMA IA 10039; heavy-duty type.
 - 2. Pushbuttons: Unless otherwise indicated, provide momentary, non-illuminated type with flush button operator; normally open or normally closed as indicated or as required.
 - 3. Selector Switches: Unless otherwise indicated, provide maintained, non-illuminated type with knob operator; number of switch positions as indicated or as required.
 - 4. Indicating Lights: Push-to-test type unless otherwise indicated.
 - 5. Provide LED lamp source for indicating lights and illuminated devices.
- C. Control and Timing Relays:
 - 1. Comply with NEMA IA 10039.
 - 2. Provide number and type of relays indicated or required to perform necessary functions.
- D. Control Power Transformers:
 - 1. Size to accommodate burden of contactor coil(s) and all connected auxiliary devices, plus _____ VA spare capacity.
 - 2. Include primary and secondary fuses.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings of enclosed controllers are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed controllers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install controllers in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed controllers plumb and level.
- F. Provide grounding and bonding in accordance with Section 260526.
- G. Install all field-installed devices, components, and accessories.
- H. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

- I. Set field-adjustable controllers and associated components according to installed motor requirements, in accordance with manufacturer's recommendations and NFPA 70.
- J. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed in accordance with Section 260573.
- K. Identify enclosed controllers in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Motor Starters: Perform inspections and tests listed in NETA ATS, Section 7.16.1.1. Tests listed as optional are not required.
- D. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers larger than 200 amperes. Tests listed as optional are not required.
- E. Correct deficiencies and replace damaged or defective enclosed controllers or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from controller enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.

3.07 PROTECTION

- A. Protect installed enclosed controllers from subsequent construction operations.

END OF SECTION 262913

**SECTION 263213
ENGINE GENERATORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator system and associated components and accessories:
 - 1. Engine and engine accessory equipment.
 - 2. Alternator (generator).
 - 3. Generator set control system.
 - 4. Generator set enclosure.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 235100 - Breechings, Chimneys, and Stacks: Engine exhaust piping.
 - 1. Includes installation of exhaust silencer specified in this section.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260548 - Vibration and Seismic Controls for Electrical Systems.
 - 1. Includes requirements for the seismic qualification of equipment specified in this section.
- F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 263600 - Transfer Switches.
- H. Section 263633 - Connection Cabinets for Portable Generators and Load Banks.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NECA/EGSA 404 - Standard for Installing Generator Sets; 2014.
- C. NEMA MG 00001 - Motors and Generators; 2024.
- D. NFPA 30 - Flammable and Combustible Liquids Code; 2024, with Errata (2025).
- E. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines; 2024, with Amendment.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 99 - Health Care Facilities Code; 2024, with Errata.
- H. NFPA 110 - Standard for Emergency and Standby Power Systems; 2025.
- I. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.
- J. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
 - a. Transfer Switches: See Section 263600.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
 1. Include generator set sound level test data.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
 1. Identify mounting conditions required for equipment seismic qualification.
- D. Manufacturer's equipment seismic qualification certification.
- E. Derating Calculations: Indicate ratings adjusted for applicable service conditions.
- F. Fuel Storage Tank Calculations: Indicate maximum running time for generator set configuration provided.
- G. Manufacturer's factory emissions certification.
- H. Source quality control test reports.
- I. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
 1. Certified prototype tests.
 2. Torsional vibration compatibility certification.
 3. NFPA 110 compliance certification.
 4. Certified rated load test at rated power factor.
- J. Field quality control test reports.
- K. Maintenance contracts.
- L. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.
 2. Extra Filter Elements: One of each type, including fuel, oil and air.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 1. NFPA 70 (National Electrical Code).
 2. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
 3. NFPA 30 (Flammable and Combustible Liquids Code).
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Packaged Engine Generator Set:
 - 1. Caterpillar Inc: www.cat.com/#sle.
 - 2. Cummins Power Generation Inc: www.cumminspower.com/#sle.
 - 3. Generac Power Systems: www.generac.com/industrial/#sle.
 - 4. Rehlko: www.powersystems.rehlko.com/#sle.
 - 5. Rolls-Royce Power Systems; MTU: www.mtu-solutions.com/#sle.
- B. Substitutions: See Section 016000 - Product Requirements.
- C. Source Limitations: Furnish engine generator sets and associated components and accessories produced by single manufacturer and obtained from single supplier.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. System Description:
 - 1. Application: Emergency/standby.
 - 2. Configuration: Single packaged engine generator set operated independently (not in parallel).
- D. Packaged Engine Generator Set:
 - 1. Type: Gaseous (spark ignition).
 - 2. Power Rating: As indicated on drawings, standby.
 - 3. Voltage: As indicated on drawings.
 - 4. Main Line Circuit Breaker Number One:
 - a. Type: Thermal magnetic.
 - b. Trip Rating: Select according to generator set rating.
 - 5. Main Line Circuit Breaker Number Two:
 - a. Type: Thermal magnetic.
 - b. Trip Rating: As indicated on drawings.
- E. Generator Set General Requirements:
 - 1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
 - 2. Factory-assembled, with components mounted on suitable base.
 - 3. List and label engine generator assembly as complying with UL 2200.
 - 4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
 - 5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
 - 6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.
- F. Seismic Qualification: Provide engine generator assemblies and associated components suitable for application under the seismic design criteria specified in IBC where required for the installed location. Include certification of compliance with submittals.
- G. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.

- H. Starting and Load Acceptance Requirements:
 1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
 2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
 3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
 4. Maximum Load Step: Supports 100 percent of rated load in one step.
- I. Exhaust Emissions Requirements:
 1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
 2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.
- J. Sound Level Requirements:
 1. Do not exceed 70 dBA when measured at 23 feet from generator set in free field (no sound barriers) while operating at full load; include manufacturer's sound data with submittals.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

- A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
- B. Engine Fuel System - Gaseous (Spark Ignition):
 1. Fuel Source: Natural gas.
 2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
 3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
 - a. Carburetor.
 - b. Gas pressure regulators.
 - c. Fuel shutoff control valves.
 - d. Low gas pressure switches.
- C. Engine Starting System:
 1. System Type: Electric, with DC solenoid-activated starting motor(s).
 2. Battery(s):
 - a. Battery Type: Lead-acid.
 - b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
 - c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
 3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
 4. Battery Charger:
 - a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
 - b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.

- c. Listed as complying with UL 1236.
 - d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
 - e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
 - f. Provide alarm output contacts as necessary for alarm indications.
- D. Engine Speed Control System (Governor):
- 1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
 - 2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.
- E. Engine Lubrication System:
- 1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
- F. Engine Cooling System:
- 1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
 - 2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
 - 3. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.
- G. Engine Air Intake and Exhaust System:
- 1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
 - 2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.
 - 3. Exhaust Silencer: Provide industrial grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements, where specified.

2.04 ALTERNATOR (GENERATOR)

- A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 00001; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.
- B. Exciter:
 - 1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
 - 2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
 - 3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
- C. Temperature Rise: Comply with UL 2200.
- D. Insulation System: NEMA MG 00001, Class H; suitable for alternator temperature rise.
- E. Enclosure: NEMA MG 00001, drip-proof.
- F. Total Harmonic Distortion: Not greater than five percent.

2.05 GENERATOR SET CONTROL SYSTEM

- A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.
- B. Control Panel:

1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
2. Generator Set Control Functions:
 - a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
 - b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
 - c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
 - d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
 - e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
 - f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
 - g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
3. Generator Set Status Indications:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase.
 - c. Frequency (Hz).
 - d. Real power (W/kW).
 - e. Reactive power (VAR/kVAR).
 - f. Apparent power (VA/kVA).
 - g. Power factor.
 - h. Duty Level: Actual load as percentage of rated power.
 - i. Engine speed (RPM).
 - j. Battery voltage (Volts DC).
 - k. Engine oil pressure.
 - l. Engine coolant temperature.
 - m. Engine run time.
 - n. Generator powering load (position signal from transfer switch).
4. Generator Set Protection and Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. In addition to NFPA 110 requirements, provide the following protections/indications:
 - 1) High AC voltage (shutdown).
 - 2) Low AC voltage (shutdown).
 - 3) High frequency (shutdown).
 - 4) Low frequency (shutdown).
 - 5) Overcurrent (shutdown).
 - 6) Fuel tank leak (warning), where applicable.
 - c. Provide contacts for local and remote common alarm.
 - d. Provide contacts for generator run condition.
 - e. Provide lamp test function that illuminates all indicator lamps.

5. Other Control Panel Features:
 - a. Event log.
 - b. Communications Capability: BACnet protocol. Provide card slot or harness for field-installable card, to be installed at a later date. Provide all accessories necessary for proper interface.
- C. Remote Annunciator:
 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 2. Generator Set Status Indications:
 - a. Generator powering load (via position signal from transfer switch).
 - b. Communication functional.
 3. Generator Set Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. Provide audible alarm with silence function.
 - c. Provide lamp test function that illuminates all indicator lamps.
- D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.06 GENERATOR SET ENCLOSURE

- A. Enclosure Type: Sound attenuating, weather protective.
- B. Enclosure Material: Steel or aluminum.
- C. Hardware Material: Stainless steel.
- D. Color: Manufacturer's standard.
- E. Access Doors: Lockable, with all locks keyed alike.
- F. Openings: Designed to prevent bird/rodent entry.
- G. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.
- H. Sound Attenuating Enclosures: Line enclosure with non-hydroscopic, self-extinguishing sound-attenuating material.
- I. Exhaust Silencers: Where exhaust silencers are mounted within enclosure in main engine compartment, insulate silencer to minimize heat dissipation as necessary for operation at rated load under worst case ambient temperature.

2.07 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.

- B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.
- C. Diesel Fuel Storage Tanks: Perform pressurized leak test prior to shipment.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive equipment.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.
- D. Arrange equipment to provide minimum clearances and required maintenance access.
- E. Unless otherwise indicated, mount generator set on properly sized, minimum 6 inch high concrete pad constructed in accordance with Section 033000.
- F. Provide required support and attachment in accordance with Section 260529.
- G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.
- H. Provide engine exhaust piping in accordance with Section 235100, where not factory installed.
 - 1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
 - 2. Do not exceed manufacturer's maximum back pressure requirements.
- I. Do not insulate piping for engine components restricted by manufacturer.
- J. Install exhaust silencer in accordance with Section 235100, where not factory installed.
- K. Provide grounding and bonding in accordance with Section 260526.
- L. Identify system wiring and components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.
- C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- D. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.
- E. Preliminary inspection and testing to include, at a minimum:
 - 1. Inspect each system component for damage and defects.
 - 2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
 - 3. Check for proper oil and coolant levels.
- F. Prepare and start system in accordance with manufacturer's instructions.
- G. Perform acceptance test in accordance with NFPA 110.
- H. Inspection and testing to include, at a minimum:

1. Verify compliance with starting and load acceptance requirements.
 2. Verify voltage and frequency; make required adjustments as necessary.
 3. Verify phase sequence.
 4. Verify control system operation, including safety shutdowns.
 5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
 6. Perform load tests in accordance with NFPA 110 (1.5 hour building load test followed by 2 hour full load test).
- I. Provide field emissions testing where necessary for certification.
 - J. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- C. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

3.06 PROTECTION

- A. Protect installed engine generator system from subsequent construction operations.

3.07 MAINTENANCE

- A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

END OF SECTION 263213

**SECTION 263323
CENTRAL BATTERY EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fast-transfer interruptible power supply (IPS) centralized emergency lighting inverters.

1.02 RELATED REQUIREMENTS

- A. Section : Concrete equipment pads.
- B. Section .
- C. Section .
- D. Section 260548 - Vibration and Seismic Controls for Electrical Systems.
 - 1. Includes requirements for the seismic qualification of equipment specified in this section.
- E. Section : Identification products and requirements.
- F. Section : Additional criteria for the selection of equipment and associated protective devices specified in this section.
- G. Section : UPS equipment for applications other than emergency lighting.
- H. Section :
 - 1. Luminaires for interface with centralized emergency lighting inverters.
 - 2. Emergency lighting unit equipment.
- I. Section : Luminaires for interface with centralized emergency lighting inverters.

1.03 REFERENCE STANDARDS

- A. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 111 - Standard on Stored Electrical Energy Emergency and Standby Power Systems; 2025.
- G. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- H. 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.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of centralized emergency lighting inverters to be installed with work provided under other sections or by others.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
 - 1. Indicate any inverter load restrictions.
 - 2. Identify mounting conditions required for equipment seismic qualification.
- C. Shop Drawings: Indicate dimensions, input/output voltages, power ratings, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of inverters and adjacent equipment with all required clearances indicated.
 - 2. Include wiring diagrams showing all factory and field connections.
- D. Derating Calculations: Indicate ratings adjusted for applicable service conditions and/or inverter load restrictions.
- E. Manufacturer's equipment seismic qualification certification.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- G. Provide NFPA 111 required documentation from manufacturer.
- H. Field quality control test reports.
- I. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
- J. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
 - 2. NFPA 111.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum years experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to inverter system components, enclosure, and finish.
- D. Do not exceed maximum ambient temperature requirements for batteries at any time, which reduces battery service life. Replace batteries exposed to temperatures in excess of manufacturer's requirements.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section , for additional warranty requirements.
- B. Inverter Assemblies: Provide minimum year manufacturer warranty covering repair or replacement due to defective materials or workmanship.
- C. Batteries: Provide pro-rata warranty for the duration of rated design life.

PART 2 PRODUCTS

2.01 CENTRALIZED EMERGENCY LIGHTING INVERTERS - GENERAL REQUIREMENTS

- A. Provide complete centralized emergency lighting inverter system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Inverter Assemblies: Manufactured units consisting of inverters, batteries, enclosures, and associated components specifically designed for emergency lighting applications; microprocessor-based utilizing pulse width modulation (PWM) with insulated gate bipolar transistors (IGBT's); listed and labeled as complying with UL 924.
 - 1. Battery Run Times of 90 Minutes: Listed as complying with UL 924 for "emergency lighting and power equipment".
 - 2. Battery Run Times Other than 90 Minutes: Listed as complying with UL 924 for "auxiliary lighting and power equipment".
- D. Provide inverters and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- E. Increase indicated power ratings as required to accommodate any applicable inverter load restrictions.
- F. Inverters Installed in Spaces Used for Environmental Air: Plenum rated; listed and labeled as complying with UL 2043, suitable for use in air-handling spaces.
- G. Battery System:
 - 1. Provide battery capacity as required for achieving battery run time indicated.
 - 2. Battery Charger: Microprocessor-controlled, temperature compensated; capable of returning supplied battery(s) from fully discharged to fully charged condition within unless otherwise indicated.
 - 3. Provide automatic low voltage battery disconnect to prevent battery "deep discharge" damage.
- H. Seismic Qualification: Provide emergency lighting inverters and associated components suitable for application under the seismic design criteria specified in Section 260548 where required. Include certification of compliance with submittals.
- I. Enclosures:
 - 1. Environment Type per NEMA EN 10250:
 - 2. Hinged Doors: Lockable, with all locks keyed alike.
 - 3. Finish:
- J. Short Circuit Current Rating: Provide inverter assemblies with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section .
- K. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category B.
- L. Automatic Sequence of Operations:
 - 1. Upon failure or degradation of primary/normal input power, transfer load to battery power.
 - 2. When primary/normal input power has been restored, retransfer load to primary/normal power and recharge battery.

- M. Input Tolerance:
 - 1. Voltage Range:
 - 2. Frequency Range:
 - 3. Total Harmonic Distortion (THD): maximum at full load.
- N. Output Requirements:
 - 1. Voltage Regulation:
 - 2. Frequency Range:
 - 3. Total Harmonic Distortion (THD): maximum for linear load.
 - 4. Load Power Factor Capability:
- O. Features:
 - 1. Control Functions:
 - a. Automatic mode.
 - b. Manual Test Mode: Simulates failure of primary/normal source.
 - 2. Status Indications:
 - a. Connected to primary/normal source.
 - b. Connected to battery power.
 - c. Primary/normal source available.
 - d. Battery charging.
 - 3. Alarm Indications (Units with Self-Testing/Self-Diagnostics):
 - a. General trouble/alarm.
- P. Features:
 - 1. Control Functions:
 - a. Automatic mode.
 - b. Manual Test Mode: Simulates failure of primary/normal source.
 - c. Automatic Shutdown Mode (IPS Inverters Only): Upon applicable inverter circuit trouble/fault unit shuts down.
 - d. Self-testing/self-diagnostics.
 - 2. Status Indications:
 - a. Connected to primary/normal source.
 - b. Connected to battery power.
 - c. Primary/normal source available.
 - d. Battery charging.
 - 3. Alarm Indications:
 - a. Output overload/overcurrent.
 - b. High temperature.
 - c. Low battery.
 - 4. Other Features:
 - a. Input circuit breaker.
 - b. Event log.

2.02 FAST-TRANSFER INTERRUPTIBLE POWER SUPPLY (IPS) CENTRALIZED EMERGENCY LIGHTING INVERTERS

- A. Description: Offline/standby or online, line interactive type inverters with maximum transfer time to battery power source upon loss of normal power source; suitable for emergency operation of incandescent, LED, fluorescent, and HID light sources.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of inverter assemblies are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.

- D. Verify that mounting surfaces are ready to receive inverter assemblies.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install inverter assemblies plumb and level.
- D. Unless otherwise indicated, mount floor-mounted inverter assemblies on properly sized high concrete pad constructed in accordance with Section .
- E. Provide grounding and bonding in accordance with Section .
- F. Identify inverter assemblies and associated system wiring in accordance with Section .

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Notify Owner and Architect at least prior to scheduled inspections and tests.
- C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- D. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank.
- E. Prepare and start system in accordance with manufacturer's instructions.
- F. Perform acceptance test in accordance with NFPA 111.
- G. Inspect and test in accordance with NETA ATS, except Section 4.
- H. Perform inspections and tests listed in NETA ATS, Section 7.22.2.
- I. Batteries and Charger: Perform inspections and tests listed in NETA ATS, Section 7.18.
- J. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.

3.06 PROTECTION

- A. Protect installed inverter assemblies from subsequent construction operations.

END OF SECTION 263323

SECTION 263633
CONNECTION CABINETS FOR PORTABLE GENERATORS AND LOAD BANKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quick connect power panels.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 263213 - Engine Generators.

1.03 ABBREVIATIONS AND ACRONYMS

- A. QCP: Quick connect panel.

1.04 REFERENCE STANDARDS

- A. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- E. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- F. UL 508 - Industrial Control Equipment; Current Edition, Including All Revisions.
- G. UL 891 - Switchboards; Current Edition, Including All Revisions.
- H. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Review material selections and installation procedures with manufacturer's representative and affected installers.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Provide sufficient information to determine compliance with Contract Documents. Identify submittal data with specific equipment tags and/or service descriptions to which they pertain. Identify specific model numbers, options, and features of equipment proposed.
- C. Indicate deviations from Contract Documents with reference to corresponding drawing or specification number and written justification for deviation.
- D. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
- E. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing factory and field connections.
- F. Operation and Maintenance Data: Provide detailed information on equipment operation and setup, replacement parts, and recommended maintenance procedures and intervals.
- G. Project Record Documents:
 - 1. Construction, installation, schematic, and wiring diagrams updated to as-installed and commissioned state.

1.07 QUALITY ASSURANCE

- A. Comply with the following:

1. NFPA 70.
 2. Requirements of authorities having jurisdiction.
 3. Applicable local codes.
- B. Manufacturer Qualifications:
1. Firm engaged in manufacture of specified products of types and sizes required, and whose products have been in satisfactory use in similar service for minimum of 10 years.
 2. Certified in accordance with ISO 9001 with applicable quality assurance system regularly reviewed and audited by third-party registrar. Develop and control manufacturing, inspection, and testing procedures under guidelines of quality assurance system.
 3. Service, repair, and technical support services available 24 hours per day, 7 days per week, 365 days per year from manufacturer or their representative.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Prior to delivery to project site, verify suitable storage space is available to store materials in well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, and corrosive atmospheres.
- B. Protect materials during delivery and storage and maintain within manufacturer's written storage requirements. At minimum, store indoors in clean, dry space with uniform temperature to prevent condensation and protect electronics from potential damage from electrical and magnetic energy.
- C. Deliver materials to project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and equipment tag number or service name as identified in Contract Documents.
- D. Inspect products and report damage or violation of delivery, storage, and handling requirements to Engineer.

1.09 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.10 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer warranty for defects in material and workmanship for 24 months from date of shipment. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 QUICK CONNECT POWER PANELS

- A. Description: Quick connect power panels with provisions for temporary facility connection to portable generators and/or load banks as indicated, in conjunction with transfer switch.
- B. Listed and labeled as complying with UL 891 or UL 1008. Products listed only to UL 50 are not acceptable.
- C. Quick Connect Power Panel:
 1. Dual Purpose Quick Connect Power Panel:
 - a. Input/Output Configuration: Dual purpose, with both input (generator) male camlocks and output (load bank) female camlocks.
 - b. Ground: Minimum 25 percent rated.
 - c. Neutral Configuration: 100 percent rated for generator input, no neutral camlocks for load bank output.
 - d. Phase Poles: Three.
 - e. Ampere Rating: As indicated on drawings.
 - f. Voltage (for Color Code): As indicated on drawings.
 - g. Enclosure: As required for installed location.

- h. Provide the following accessories:
 - 1) 20 A, 120 VAC battery charger receptacle and 30 A, 125 V, L6-30 heater receptacle, wired to external source.
- D. General Requirements:
1. Withstand Current Ratings (WCR): Verified by testing supervised by nationally recognized testing laboratory (NRTL), not by calculation.
 2. Input/Output Temporary Camlock Connections:
 - a. Camlock Connectors: Single-pole, camlock type, series 16.
 - b. Input (Generator) Camlock Connections:
 - 1) Provide one row of recessed male camlock connectors for every 400 A of capacity or fraction thereof.
 - 2) For each row, provide five camlock connectors (one for each phase, one for neutral, and one for ground).
 - c. Output (Load Bank) Camlock Connections:
 - 1) Provide one row of female camlock connectors with flip covers for every 400 A of capacity or fraction thereof.
 - 2) For each row, provide four camlock connectors (one for each phase and one for ground).
 - d. Camlock Connector Color Code:
 - 1) 240 V and Below:
 - (a) Phase 1: Black.
 - (b) Phase 2: Red.
 - (c) Phase 3 (Where Required): Blue.
 - 2) 440 V to 480 V:
 - (a) Phase 1: Brown.
 - (b) Phase 2: Orange.
 - (c) Phase 3: Yellow.
 - 3) 600 V:
 - (a) Phase 1: Black.
 - (b) Phase 2: Black.
 - (c) Phase 3: Black.
 - 4) Neutral: White.
 - 5) Ground: Green.
 3. Ground: Minimum 25 percent rated.
 4. Temporary Cable Provisions:
 - a. Provide access holes for wiring chamber entry/exit specifically designed for conductors, with bushing or inherent design with no sharp edges that may come in contact with conductor insulation.
 - b. Arrange connections so that cables drape downward when connected.
 5. Enclosure:
 - a. Construction: Aluminum or steel painted ANSI 61 gray or Type 316 stainless steel as indicated.
 - b. Comply with UL 50 or UL 508.
 - c. UL 50E Rating: Type 3R, maintained with temporary cables installed.
- E. Dual Purpose Quick Connect Power Panels:
1. Provide both input (generator) and output (load bank) temporary connections, designed for nonsimultaneous operation.
 2. Dual Purpose QCPs with Isolation Breaker:
 - a. Configuration: Wall mounted.
 - b. Available Ratings: 150 A to 800 A; up to 600 VAC.
 - c. Features:
 - 1) Divided into multiple chambers.
 - 2) Upper Termination Chamber:

- (a) Deadfront front panel covering exposed parts.
 - (b) Molded case circuit breaker with trap key interlock.
 - (c) Output (load bank) camlock connections mounted on side behind pad-lockable door.
 - (d) Load dump twist lock receptacle (L1-15R, 15 A, 125 V).
 - (e) Lug terminals for permanently installed conductors.
 - 3) Lower Wiring Chamber:
 - (a) Exterior door with trap key interlock.
 - (b) Trapdoor housing input (generator) smart mechanical lugs.
 - (c) Input (generator) camlock connections.
 - (d) Phase rotation relay with fuses.
 - (e) 2-wire auto-start terminals.
 - (f) Auto-start destination toggle switch.
 - 4) Hinged cover held closed by corrosion-resistant springs to cover cable access holes when temporary cables are not installed.
 - d. Withstand Current Rating (WCR): Not less than 14 kA.
 - e. Dimensions: Not to exceed 30 inches wide by 21 inches deep by 46 inches high.
3. Dual Purpose QCPs (No Breaker):
 - a. Configuration: Pad mounted.
 - b. Available Ratings: 800 A to 4,000 A; up to 600 VAC.
 - c. Features:
 - 1) Divided into multiple chambers.
 - 2) Upper Termination Chamber:
 - (a) Exterior pad-lockable door.
 - (b) Output (load bank) camlock connections.
 - (c) Load dump twist lock receptacle (L1-15R, 15 A, 125 V).
 - (d) Lug terminals for permanently installed conductors.
 - 3) Lower Wiring Chamber:
 - (a) Exterior pad-lockable tamper-resistant door with trap key interlock.
 - (b) Trap door for cable egress.
 - (c) Input (generator) camlock connections.
 - (d) Slotted fingers to restrict cable access.
 - (e) Phase rotation relay with fuses.
 - (f) 2-wire auto-start terminals.
 - (g) Auto-start destination toggle switch.
 - 4) Trap key interlock for field installation on permanent generator breaker.
 - 5) Shared common bus for input and output connections.
 - 6) Accommodate rear, side, and bottom cable entry.
 - d. Withstand Current Rating (WCR): Not less than 100 kA.
 - e. Dimensions:
 - 1) 800 A to 2,000 A QCPs: Not to exceed 31 inches wide by 50 inches deep by 57 inches high.
 - 2) 2,400 A to 4,000 A QCPs: Not to exceed 48 inches wide by 50 inches deep by 57 inches high.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine equipment exterior and interior for damage, including but not limited to, structure, moisture, and mildew.
- B. Examine for conditions detrimental to completion of work.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturer's written instructions.

- B. Install quick connect power panels in accordance with NECA 1.
- C. Unless otherwise indicated, install and anchor floor-mounted and pad-mounted QCPs on raised concrete pad 4 inches high; see Section 033000.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Operational Readiness Testing:
 - 1. Inspect and test equipment and associated systems for conformance to Contract Documents, including equipment manufacturer's recommendations, and readiness for operation.
 - a. Visually inspect for physical damage and proper installation.
 - b. Perform tests in accordance with manufacturer's instructions.
 - c. Perform tests to verify compliance with Contract Documents.
 - d. Perform tests to verify equipment is ready for operation.
 - e. Touch-up paint chips and scratches with manufacturer-supplied paint.
- C. Correct deficiencies and replace damaged or defective equipment or associated components.

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION 263633

**SECTION 264300
SURGE PROTECTIVE DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surge protective devices for service entrance locations.
- B. Surge protective devices for distribution locations.
- C. Surge protective devices for branch panelboard locations.

1.02 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 262416 - Panelboards.

1.03 ABBREVIATIONS AND ACRONYMS

- A. EMI/RFI: Electromagnetic Interference/Radio Frequency Interference.
- B. SPD: Surge Protective Device.

1.04 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- C. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
- C. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
 - 1. UL 1449.
 - 2. UL 1283 (for Type 2 SPDs).
- D. 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.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.
- C. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

PART 2 PRODUCTS

2.01 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
 - 1. Wye Systems: L-N, L-G, N-G, L-L.
 - 2. Delta Systems: L-G, L-L.
 - 3. Single Split Phase Systems: L-N, L-G, N-G, L-L.
 - 4. High Leg Delta Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
 - 1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
 - 2. 240/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
 - 3. 480Y/277V System Voltage: Not more than 1,500 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.
 - 4. 480V Delta System Voltage: Not more than 1,800 V for L-G mode and 3,000 V for L-L mode.
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - 1. Indoor clean, dry locations: Type 1.
 - 2. Outdoor locations: Type 3R.

2.02 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

- A. Surge Protective Device:
 - 1. Protection Circuits: Field-replaceable modular or non-modular.
 - 2. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
 - 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.

4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the short circuit current rating of the equipment the SPD is connected to, including any series ratings.
5. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - c. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
6. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch.

B. -----

C. Use the following paragraphs to specify basis of design products from selected manufacturers or use the paragraphs above to specify generic, nonproprietary descriptions.

2.03 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

A. Distribution locations include SPDs connected to distribution panelboards, motor control centers, and busway.

B. -----

C. Use the following paragraphs to specify basis of design products from selected manufacturers or use the paragraphs above to specify generic, nonproprietary descriptions.

2.04 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS

A. Surge Protective Device:

1. Protection Circuits: Field-replaceable modular or non-modular.
2. Surge Current Rating: Not less than 60 kA per mode/120 kA per phase.
3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
5. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

B. -----

C. Use the following paragraphs to specify basis of design products from selected manufacturers or use the paragraphs above to specify generic, nonproprietary descriptions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of drawings and manufacturer's instructions.
- D. Verify system grounding and bonding is in accordance with Section 260526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.
- D. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.
- E. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
- F. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 260526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.
- G. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.

3.04 CLEANING

- A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 264300

**SECTION 265100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.

1.02 RELATED REQUIREMENTS

- A. Section 260529 - Hangers and Supports for Electrical Systems.
- B. Section 260533.16 - Boxes for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

- A. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2024.
- B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- D. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2025.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- J. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
 - 2. Substitutions:
 - a. Where fixtures are substituted, provide photometric studies confirming performance equal to or better than basis of design fixtures.
 - 1) Studies shall be completed using approved lighting analysis software programs.
 - 2) Indicate mounting height, orientation, fixture light loss factor, lumens, and input wattage.
 - 3) Include results for both normal utility power and emergency (loss of utility power) configurations.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
 - 1. Sealed maintenance-free lead calcium unless otherwise indicated.
 - 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- G. Accessories:
 - 1. Provide compatible accessory mounting brackets where indicated or required to complete installation.

2.04 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 - 2. Directional Arrows: As indicated or as required for installed location.
- B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.

2.05 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - a. Network Lighting Controls: See Section 260945.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- E. Provide required support and attachment in accordance with Section 260529.
- F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- G. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure pendant-mounted luminaires to building structure.
 - 4. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 5. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- H. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- I. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
- J. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- K. Install accessories furnished with each luminaire.
- L. Bond products and metal accessories to branch circuit equipment grounding conductor.
- M. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

- N. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 - 2. Install lock-on device on branch circuit breaker serving units.
- O. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 265100

**SECTION 265600
EXTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts.
- C. Poles and accessories.
- D. Luminaire accessories.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.
- E. Section 262726 - Wiring Devices: Receptacles for installation in poles.
- F. Section 265100 - Interior Lighting.

1.03 REFERENCE STANDARDS

- A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals; 2013, with Editorial Revision (2025).
- B. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.
- C. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- D. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2024.
- E. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- G. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).
- H. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Shop Drawings:
 - 1. Provide photometric calculations where luminaires are proposed for substitution upon request.
 - 2. Provide structural calculations for each pole. Where applicable, include pole base, attachment arms, fixtures, and accessories such as cameras or lightning rods.
 - a. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
 - 3. Provide pole base design, signed and sealed by a Professional Engineer registered in the state of Alabama.
 - a. Design shall account for soil conditions to ensure assembly will not exhibit excessive tilting or settling after installation.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
 - 3. Lamps: Include rated life and initial and mean lumen output.
 - 4. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.
- D. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires and accessories to be installed and comply with designated structural design criteria.
- E. Field Quality Control Reports.
 - 1. Include test report indicating measured illumination levels.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- G. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Fuses: Five percent of total quantity installed for each type, but not less than two of each type.
 - 3. Touch-Up Paint: 2 gallons, to match color of pole finish.
- I. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 2-year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 016000 - Product Requirements.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- H. Exposed Hardware: Stainless steel.

2.03 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
 - 3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.04 POLES

- A. All Poles:
 - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
 - 2. Structural Design Criteria:
 - a. Comply with AASHTO LTS.
 - b. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
 - 1) Design Wind Speed: IBC or ASCE 7, with gust factor of 1.3.

- c. Dead Load: Include weight of proposed luminaire(s) and associated supports and accessories.
- 3. Material: Steel, unless otherwise indicated.
- 4. Shape: Square straight, unless otherwise indicated.
- 5. Finish: Match luminaire finish, unless otherwise indicated.
- 6. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
- 7. Unless otherwise indicated, provide with the following features/accessories:
 - a. Top cap.
 - b. Handhole.
 - c. Anchor bolts with leveling nuts or leveling shims.
 - d. Anchor base cover.
 - e. Provision for pole-mounted weatherproof GFI receptacle where indicated.
- B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

2.05 ACCESSORIES

- A. Camera mounting plate where indicated, with additional handhole adjacent to camera mount.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Pole-Mounted Luminaires:
 - 1. Maintain the following minimum clearances:
 - a. Comply with IEEE C2.
 - b. Comply with utility company requirements.
 - 2. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - e. Install anchor base covers or anchor bolt covers as indicated.

3. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
 - b. Provide supplementary ground rod electrode as specified in Section 260526 at each pole bonded to grounding system as indicated.
 4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
 5. Install weather resistant GFI duplex receptacle with weatherproof cover as specified in Section 262726 in designated poles.
- H. Install accessories furnished with each luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.
- E. Measure illumination levels at night with calibrated meters to verify compliance with performance requirements. Record test results in written report to be included with submittals.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.

3.05 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 265600

**SECTION 270528
PATHWAYS FOR COMMUNICATIONS SYSTEMS**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Cable supports and positioning devices.
- B. Related Requirements:
 - 1. Section 260510 "Common Work Results for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
 - 2. Section 078413 "Penetration Firestopping" specifies firestopping for communications pathways installed by this Section.
 - 3. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding conductors and connectors for communications pathways installed by this Section.
 - 4. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers and supports for communications pathways installed by this Section.
 - 5. Section 260533.13 "Conduits for Electrical Systems" specifies common raceway types installed by this Section:
 - 6. Section 260533.16 "Boxes and for Electrical Systems" specifies boxes, extension rings, and covers.
 - 7. Section 260553 "Identification for Electrical Systems" specifies labels and warning signs for communications pathways installed by this Section.

1.02 ACTION SUBMITTALS

- A. Product Data:
 - 1. For each type of product.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.
- B. 29 CFR 1910.145 - Accident Prevention Signs and Tags; Current Edition.
- C. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. TIA-598 - Optical Fiber Cable Color Coding; 2014d, with Addendum (2018).
- F. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. 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.

PART 2 PRODUCTS

2.01 CABLE SUPPORTS AND POSITIONING DEVICES

- A. Description: This category covers straps, hooks, and similar types of hardware for installation and use in communications cabling systems in accordance with NFPA 70 and manufacturer's installation instructions
- B. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

- C. UL DWMU - J-Hook or G-Hook Cable Support:
 - 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. ABB, Electrification Business
 - b. ADI
 - c. Cablofil; Legrand North America, LLC
 - d. Elite Components Inc.; subsidiary of SIGMA Piping Products (SPP) LLC
 - e. Panduit Corp
 - f. Southwire Company, LLC
 - 2. Source Limitations: Obtain products from single manufacturer.
 - 3. Product Listing Criteria: UL CCN DWMU; including UL 2239 or UL 1565.
 - 4. Product Characteristics:
 - a. Material: Galvanized steel.
- D. UL DWMU - Conduit or Cable Support Strap:
 - 1. Product Listing Criteria: UL CCN DWMU; including UL 2239 or UL 1565.
 - 2. Product Characteristics:
 - a. Conduit, Cable, or Tubing Bundle Capacity: as required.
 - 3. Required Product Options:
 - a. Suitable for use in air handling space.
- E. UL ZODZ - Cable Tie or Management System:
 - 1. Product Listing Criteria: UL CCN ZODZ; including UL 62275.
 - 2. Product Characteristics:
 - a. Classification: Type 2 or 21.
 - b. Bundle Capacity: as required.
 - c. Mechanical Strength: 80 N.
 - 3. Required Product Options:
 - a. UL 2043 Air-Handling Spaces Rating: AH-2 nonmetallic or composite components.

PART 3 EXECUTION

3.01 SELECTION OF PATHWAYS FOR COMMUNICATIONS SYSTEMS

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Architect for resolution of conflicting requirements.
- B. Minimum Pathway Size:
 - 1. For Copper and Aluminum Cables: Metric designator 21 (trade size 3/4).
 - 2. For Optical-Fiber Cables: Metric designator 25 (trade size 1).
- C. Maximum Pathway Length Between Cable Access Points: 100 ft.
- D. Temperature Limitations:
 - 1. Type PVC, Type HDPE, Type EPEC, Type OFR, and Type CR: Do not install where ambient temperature exceeds 104 deg F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.
- E. Outdoor Pathways:
 - 1. As specified in Section 260533.13 Conduit for Electrical Systems.
- F. Indoor Pathways:
 - 1. Other than as indicated below, as specified in Section 260533.13 Conduit for Electrical Systems.
 - a. Concealed above Suspended Ceilings: Cable tray, Hooks, or conduits.
- G. Duct Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.
 - 1. ERMC and IMC: Provide threaded-type fittings unless otherwise indicated.

- H. Surface Raceways: Where indicated on Drawings.
- I. Cable Supports and Positioning Devices:
 1. Size hooks to allow minimum of 25 percent future capacity without exceeding design capacity limits.
 2. Support hooks directly from building structure. Do not use ceiling grid support rods or wires.
 3. Hook spacing must allow no more than 6 inch of slack. Lowest point of cables must be no closer than 12 inches to ceiling tiles, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
 4. Space hooks as indicated by cable manufacturer, but in no case more than 5 ft on center.
 5. Provide hook at each change in direction.
- J. Boxes and Enclosures:
 1. Outdoors, Aboveground: UL 50E Type 3R.
 2. Indoors: UL 50E Type 1, except use Type 4 nonmetallic units in institutional and commercial kitchens and damp or wet locations.

3.02 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

- A. Comply with 29 CFR 1910.144 for color identification of hazards, and the following:
 1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
 2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.
- B. Color Coding Scheme for Communications Cable and Terminations: Comply with BICSI N1 and TIA-598.
- C. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
 1. "COMMUNICATIONS."
 2. "FIRE ALARM."
 3. "SECURITY."
- D. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- E. Locations of Underground Lines: Underground-line warning tape for communication, control wiring, and optical-fiber cable.
- F. Equipment and Cabling Identification for Administrative Records and Labeling: Comply with TIA-606 requirements for Class 2 network administration.
- G. Horizontal Cables: Label each cable with a vinyl-wraparound label.
- H. Cover Plates: Identify cover plate in accordance with TIA-606.
- I. Cable Ties: General purpose, for attaching tags, except as listed below:
 1. Outdoors: UV-stabilized nylon.
 2. In Spaces Handling Environmental Air: Plenum rated.

3.03 SELECTION OF SIGNS AND HAZARD MARKINGS

- A. Comply with 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs.
- B. Signs, labels, and tags required for personnel safety must comply with the following standards:
 1. Safety Colors: NEMA Z535.1.
 2. Facility Safety Signs: NEMA Z535.2.
 3. Safety Symbols: NEMA Z535.3.
 4. Product Safety Signs and Labels: NEMA Z535.4.
 5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

3.04 INSTALLATION OF PATHWAYS FOR COMMUNICATIONS SYSTEMS

- A. Comply with manufacturers' published instructions, including limitations on distance, bends, and bend radius.
- B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:
 - 1. General Installation Requirements: NFPA 70 and NECA NEIS 1
 - 2. Type OFR Optical-Fiber Raceways: Article 800 of NFPA 70 and BICSI N1.
 - 3. Type CR Communications Raceways: Article 800 of NFPA 70 and BICSI N1.
 - 4. Cable Supports and Positioning Devices: Article 800 of NFPA 70 and BICSI N1.
 - 5. Consult Architect for resolution of conflicting requirements.
- C. Special Installation Techniques:
 - 1. Complete communications raceway installation before starting conductor installation.
 - 2. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.
 - 3. Provide hangers and supports for pathways, boxes, and enclosures.
 - 4. Firestop pathway penetrations of fire-rated assemblies.
 - 5. Identification:
 - a. Provide colors and labels for pathways, boxes, enclosures, and associated communications equipment.
 - b. Provide safety warning signs.
- D. Interfaces with Other Work:
 - 1. Coordinate installation of new communications pathways with existing conditions.
 - 2. Grounding and Bonding: Bond metallic communications boxes and enclosures to metallic pathways.

END OF SECTION 270528

**SECTION 313116
TERMITE CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Chemical soil treatment.

1.02 RELATED REQUIREMENTS

1.03 SUBMITTALS

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

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. Spray apply toxicant in accordance with manufacturer's instructions.
- B. Apply toxicant at following locations:
- C. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- D. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.
- E. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- F. Re-treat disturbed treated soil with same toxicant as original treatment.
- G. 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

**SECTION 323913.19
DECORATIVE METAL BOLLARDS**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Metal bollard covers
 - 2. Decorative metal bollards.
 - 3. Accessories
- B. Related Requirements:
 - 1. [Division 03 Sections: [Concrete] [Mortar] fill for security posts.]

1.02 REFERENCE STANDARDS

- A. ASTM A536 - Standard Specification for Ductile Iron Castings; 2024.
- B. ASTM A36 – Standard Specification for Carbon Structural Steel.
- C. ASTM A312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- D. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- E. ASTM B26 – Standard Specification for Aluminum-Alloy Sand Castings.

1.03 SUBMITTALS

- A. Manufacturer's Product Data
 - 1. Comply with Section 01 33 00 – Submittal Procedures.
 - 2. Product Data: Provide for each type of bollard, component, finish, and accessory specified.
 - 3. Color Samples: Submit manufacturer's standard colors for selection.
 - 4. Maintenance Data: Submit manufacturer's field touch-up, cleaning, and maintenance instructions.
 - 5. Warranty Documentation: Submit sample of manufacturer's warranty.
- B. LEED Submittals
 - 1. Credit MR 4, Recycled Content: For products having recycled content, provide Product Data indicating percentages by weight of post-consumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Setting Drawings: Show embedded items and cutouts required for work specified by other Sections.

1.04 QUALITY ASSURANCE

- A. Comply with Section 01 43 00 – Quality Assurance.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with Section 01 66 00 – Product Storage and Handling Requirements.
- B. Protect bollards and accessories during delivery, storage, and handling.

1.06 WARRANTY

- A. Comply with Section 01 78 36 – Warranties.
- B. Provide manufacturer's standard warranty against defects in materials and workmanship.
 - 1. Warranty Period: Five years from date of invoice, except as otherwise indicated.
 - a. Coatings: Two years, against peeling, cracking, or significant color change.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Reliance Foundry Co. Ltd.
 - 1. Phone: 604-547-0460 or 1-877-789-3245
 - 2. Fax: 604-590-8875
 - 3. Website: <http://www.reliance-foundry.com/bollard>
 - 4. Email: info@reliance-foundry.com
- B. Substitutions: Comply with provisions of Section 01 25 00 "Substitution Procedures"

2.02 METAL BOLLARD COVERS

- A. Bollard Decorative Metal Bollard:



- 1. Height: 44 inches (1117.6 mm)
- 2. Diameter: 11 3/4 inches (19.05 mm) body; 11 3/4 inches (19.05 mm) base
- 3. Weight: 154 lbs. (69.9 kg)
- 4. Design: Cylindrical with segmented rings and rounded top
- 5. Material: Steel body with ductile iron cap
- 6. Country of Origin: China
- 7. Color Coating:
 - a. Color: Black textured semi gloss
- 8. Installation:
 - a. Fixed, new concrete, anchor.

2.03 ACCESSORIES

- A. Security Post:
 - 1. Pipe: ASTM 500 B Structural Grade Steel
 - 2. Manufacturer: Reliance Foundry Co. Ltd.
 - 3. Country of Origin: United States.
 - 4. Base Diameter: 4.5 inches (114.3 mm)
 - 5. Finish: Red primer.
 - 6. Installation:

-
- a. Direct embed.
 - b. Footing and fill; Concrete or mortar, 3000 psi (20684.28 kPa) minimum.
- B. Chain:
- 1. 5/16-inch galvanized steel chain, Grade 30, with quick-release type connections.] Provide sufficient lengths to provide drape shown on Drawings.
 - 2. Chain Eye: 5/16-inch diameter steel.
 - 3. Quick Links: Powder coated chain links with barrel nut closures.
 - 4. Finish: Powder coated to match bollard

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine paving or other substrates for compliance with manufacturer's requirements for placement and location of embedded items, condition of substrate, and other conditions affecting installation of bollards.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Comply with manufacturer's installation instructions and setting drawings.
- B. Do not install damaged, cracked, chipped, deformed or marred bollards. Field touch-up minor imperfections in accordance with manufacturer's instructions. Replace bollards that cannot be field repaired.

3.03 CLEANING & PROTECTION

- A. Protect bollards against damage.
- B. Immediately prior to Substantial Completion, clean bollards in accordance with manufacturer's instructions to remove dust, dirt, adhesives, and other foreign materials.
- C. Touch up damaged finishes according to manufacturer's instructions.

3.04 CLOSEOUT ACTIVITIES

- A. Provide executed warranty.

END OF SECTION

Ashville Fire Station

ASHVILLE, ST. CLAIR COUNTY, ALABAMA

August 6, 2025

REPORT OF GEOTECHNICAL EXPLORATION

Prepared By



Goodwyn Mills Cawood, LLC
117 Jefferson Street North
Huntsville, AL 35801
T 256.539.3431
www.gmcnetwork.com

GMC PROJECT NUMBER: GHUN250014



Goodwyn Mills Cawood August 6, 2025

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Mr. Jay Purkey, AIA
GMC
117 Jefferson Street North
Huntsville, AL 35801

**RE: REPORT OF GEOTECHNICAL EXPLORATION
ASHVILLE FIRE STATION
ASHVILLE, ST. CLAIR COUNTY, ALABAMA
GMC PROJECT GHUN250014**

Dear Mr. Purkey,

Goodwyn Mills Cawood, LLC (Geotechnical & Construction Services Division) is pleased to provide this report of geotechnical exploration performed for the above referenced project. This report includes the results of field and laboratory testing and general recommendations for foundation design and site recommendations.

We appreciate the opportunity to perform this study on this phase of the project for you and look forward to continued participation during the construction phase of this project. If you have any questions pertaining to this report, or if we may be of further service, please do not hesitate to call.

Sincerely,
GOODWYN MILLS CAWOOD, LLC


David D. Gamlin, PE
Geotechnical Engineer
Licensed Alabama 51465




Kevin W. Wales, PE
Executive Vice President
Licensed Alabama 20146



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1.0 EXECUTIVE SUMMARY

A geotechnical exploration has been conducted for the proposed Ashville Fire Station to be located at the southeast corner lot of 6th Avenue and 6th Street in Ashville, Saint Clair County, Alabama. The new fire station will be approximately 11,500 SF. GMC has been provided with a site plan with topographic information; however, structural and grading information has not been provided. We have assumed the structure will be masonry (CMU) construction with maximum column loads of 150 kips and wall loads of 4 kips/ft. We anticipate final grades will be within 3 feet of existing site grades.

Seven (7) soil test borings were drilled across the site. Five borings, B-1 through B-5, were drilled in the planned building area to a depth of 25 feet each or auger refusal, whichever occurred first. Boring B-3 was advanced to 32.5 feet (Auger Refusal) to account for low SPT N-Values at the original boring termination depth. Borings B-4 and P-2 encountered auger refusal at 3 feet. Borings P-1 and P-2 were drilled in planned pavement areas.

Surficial material consisted of grassed areas with approximately 1 to 4 inches of organic-laden material (topsoil) and about 2 inches of gravel in the existing gravel parking area. All borings encountered approximately 2 to 4 feet of existing fill materials. Existing fill generally consisted of very soft to hard, lean to fat clays with varying amounts of sand, silt, and organics. It is likely that borings encountered a combination of old structural fill as well as backfill and buried debris from previously demolished structures, pavements, or abandoned utilities.

Below the existing fill materials, residual soils consisting of very soft to very stiff fat CLAY (CH) were encountered. SPT N-values ranged from 2 to over 22 blows per foot (bpf).

Auger refusal was encountered in five (5) borings at varying depths. Groundwater was encountered in one boring at a depth of 14 feet.

The main development issues for this site are the presence of the variable existing fill materials and highly plastic expansive clays (CH) present at the site. Settlements above tolerable limits may occur if the fill material is left in place. **We recommend the bid documents include the removal of the existing fill material in the building area and drives. Depending on the final grades, we recommend a minimum undercut and replacement of 36-inches should be budgeted in the building area and 18-inches in proposed parking areas. The limits of the undercut should extend 10 feet beyond the building perimeter and 5 feet behind the edge of planned pavements.**

Shallow foundations can be used and should be sized for a net allowable bearing pressure of 2,500 pounds per square foot (psf). The foundations should bear in or on newly placed compacted fill material or in stiff or very stiff naturally occurring soils. **Exterior foundations should bear at a minimum of 36-inches below exterior adjacent grade.** Interior foundations should bear at a minimum of 12-inches.



2.0 PROJECT INFORMATION AND SCOPE OF WORK

2.1 Project Information

A geotechnical exploration has been conducted for the proposed Ashville Fire Station to be located at the southeast corner lot of 6th Avenue and 6th Street in Ashville, Saint Clair County, Alabama. The new fire station will be approximately 11,500 SF. GMC has been provided with a site plan; however, structural and grading information has not been provided. We have assumed the structure will be masonry (CMU) construction with maximum column loads of 150 kips and wall loads of 4 kips/ft. We anticipate final grades will be within 3 feet of existing site grades.

Once final structural and grading plans are completed, we should have the opportunity to review them and amend recommendations herein, if necessary.

2.2 Scope of Work

The purpose of this exploration was to perform a general evaluation of the subsurface soil conditions at the site and to provide general sitework recommendations and foundation recommendations. The scope of the exploration and evaluation included drilling a total of seven (7) soil test borings across the site. Five borings, B-1 through B-5, were drilled in the planned building area to a depth of 25 feet each or auger refusal, whichever occurred first. Boring B-3 was advanced to 32.5 feet (Auger Refusal) to account for low SPT N-Values at the original boring termination depth. Two borings, P-1 through P-2, were drilled in the planned pavement areas. The scope also included an engineering evaluation of the materials encountered.

The scope of services for the geotechnical study did not include any environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring records regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

2.3 Field Exploration

The borings were performed on June 19, 2025 using a Geoprobe drill rig equipped with a rotary head and hollow stem augers (HSA). Soils were sampled using a two-inch OD split barrel sampler in accordance with ASTM D1586 driven with an automatic hammer. The borings were backfilled with the soil cuttings prior to leaving the site.

2.4 Laboratory Testing

The laboratory-testing program included visual classification of all soil samples and laboratory tests consisting of natural moisture contents, grain size analysis, and Atterberg limits tests were performed on selected samples. The laboratory testing program was conducted in general accordance with applicable ASTM standards, and the results are indicated on the Boring Records and summarized in the Appendix.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 General

At the time of this study, the site had a slight slope from a low of about EL 567 feet at the northwest corner of the property to a high of about EL 577 feet at the southeast corner of the property. The proposed site is located in the downtown Asheville area and contained typical landscaping features including a grassed area and gravel parking. Historical aerial imagery indicates a building (demolished between 1997-2005) occupied the west half of the site. It is likely that other ancillary structures, pavements, or utilities were present within the site at this time or earlier.

Photographs of the site at the time of our exploration are shown below:



3.2 Site Geology

Published geologic information indicates the site is likely underlain by the Knox Group Formation and is mapped in close proximity to the Conasauga Formation. The Knox Group Formation consists of light gray to light brown sandy dolomite, dolomitic limestone, and limestone, often containing chert. The Conasauga Formation consists of bluish gray, fine-grained, thin-bedded argillaceous limestone and interbedded dark gray shale.

3.3 Sinkhole Potential

Since both the Knox Group and Conasauga Formations contain primarily carbonate rock, it is susceptible to dissolution from the groundwater as it moves through joints and fissures in the rock formation. As dissolution progresses, cavities begin to form within the rock mass and the overlying residual soil can be eroded downward into the slots, therefore forming sinkholes in the overburden soils. Sinkholes can form spontaneously and are extremely difficult to predict. Sinkhole activity can be influenced by many factors, including both on-site and off-site activities.

Since the movement of water through the soil and bedrock can influence the dissolution process, site grading should be designed to minimize the surface water infiltration. It should be noted that in the developing the site, there is a risk of future sinkhole development, however taking precaution during development can reduce the potential. However, the level of these risks cannot be defined since they are partially controlled by nature. To



minimize the potential, we recommend that water be diverted away from structures and collected in catch basins, construct drainage swales away from structures and roads, provide positive drainage away from structures, minimize or do not install irrigation systems, and use the on-site clays for bedding material. With these precautions, it is our opinion that the site will have no greater risk of subsidence than the nearby developments overlying similar geologic conditions. Our geologic publication and map review indicates there are documented sinkholes within five miles of this site. However, the borings did not encounter any voids or evidence of current sinkhole activity on this site within the depths explored.

Similar types of construction have been successfully developed in this area. This site poses no more sinkhole risk than adjacent developments.

3.4 Subsurface Conditions

The subsurface descriptions contained herein are of a generalized nature to highlight the major soil stratification features and soil characteristics. The boring records included in the Appendix should be reviewed for specific information as to individual boring locations. The stratification shown on the boring records represents conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials, and the transition may be gradual.

Surficial Material

Borings located in the grass areas typically encountered 1 to 4 inches of organic-laden material (topsoil). Borings located in the existing gravel parking area generally encountered 2 inches of gravel.

Existing Fill

All borings encountered approximately 2 to 4 feet of existing fill materials. The following table summarizes the fill material encountered:

Boring Number	Approximate Ground Surface Elevation (feet)	Approximate Depth of Fill Material (feet)
B-1	570	3
B-2	573	4
B-3	569	4
B-4	572	3
B 5	570	1.5
P-1	567	5.5
P-2	575	3

Existing fill generally consisted of very soft to hard fat CLAY (CH) and with varying amounts of sand, silt, and organics. It is likely that borings encountered a combination of old structural fill, as well as backfill and buried debris from previously demolished structures, pavements, or abandoned utilities. SPT N-values ranged from 0 to over 50 blows per foot (bpf) indicating variable uncompacted materials.



Residual Materials

Below the existing fill materials, the borings encountered very soft to very stiff fat CLAY (CH) with varying amounts of sand. SPT N-values ranged from 2 to over 22 blows per foot (bpf).

The fat clays (CH) encountered at the site are potentially expansive and tend to shrink or swell with a corresponding loss or gain in moisture content. Such moisture changes can occur over the seasons of the year and can be more pronounced along the exterior of the building.

Auger Refusal

Auger refusal was encountered in five (5) of the borings at depths noted below:

Boring	Auger Refusal (AR) Depth / Elevation
B-1	23 ft (AR) / 547 ft
B-3	32.5 ft (AR) / 536.5 ft
B-4	3 ft (AR) / 569 ft
B-5	18 ft (AR) / 552 ft
P-2	3 ft (AR) / 572 ft

It is likely that borings B-4 and P-2 encountered and refused on old debris. Offset borings were attempted and encountered refusal again.

3.5 Groundwater Information

Groundwater was encountered in boring B-1 at a depth of 14 feet below existing grade at the time of drilling. Groundwater was not encountered in any of the other borings. The borings were backfilled prior to leaving the site for safety reasons and therefore no long-term groundwater levels were recorded. It is important to note that the groundwater levels may not have stabilized in the borings. Furthermore, groundwater levels may vary due to seasonal conditions and recent rainfall.



4.0 SITEWORK RECOMMENDATIONS

4.1 General

The main development issues for this site are the presence of the variable existing fill materials and highly plastic expansive clays (CH) present at the site. Settlements above tolerable limits may occur if the fill material is left in place. **We recommend the bid documents include the removal of the existing fill material in the building area and drives. Depending on the final grades, we recommend a minimum undercut and replacement of 36-inches should be budgeted in the building area and 18-inches in proposed parking areas. The limits of the undercut should extend 10 feet beyond the building perimeter and 5 feet behind the edge of planned pavements.**

4.2 Sitework Recommendations

Clearing and Stripping

Sitework should begin with clearing and grubbing of the site and should include the removal of the organic laden material as well as any existing materials (old concrete, asphalt, base stone, or abandoned utilities) in the proposed building footprint. Trees and root balls should also be removed from the construction areas.

Existing Fill

Non-uniform fill materials were encountered across the site. If the existing fill material is left in place, settlements above tolerable limits (i.e. 1-inch total, ½-inch differential) should be expected. **We recommend bid documents include the removal of all the existing fill material and debris by undercutting a minimum of 36-inches in the proposed building areas and 18-inches in proposed parking areas and replacing with a select, off site low plasticity borrow material.** It should be noted that deeper depths may be encountered between our borings. The limits of the undercut should extend 10 feet beyond the building perimeter and 5 feet behind the edge of planned pavements.

Fat Clays (CH)

Depending on the final grades of the site, fat clays may be present at the planned subgrade elevation if they are not removed by the undercutting of the fill material. If this is the case, we recommend that grading activities include providing a minimum of 24-inches of low plasticity soils directly below the slab subgrade. This may include undercutting the existing subgrade soils in order to provide the minimum 24-inch layer. The parking and drive areas of the site should have a minimum of 12-inches of low-plasticity soils below the pavement base layer. We recommend that the structural area include the proposed building footprint and at least 10 feet beyond the building perimeter and should extend 5 feet beyond the pavement edge. In addition, any new fill material should comply with the requirements of Section 4.4.

Proofrolling

Once the site has been undercut and prior to the placement of any new fill, the areas should be proofrolled with repeated passes of a loaded tandem axle dump truck to locate deeper soft soils. Soils that are observed to rut or deflect excessively under the moving load should be undercut and replaced with properly compacted fill. The proofrolling, undercutting, and filling activities should be witnessed by a qualified representative of the geotechnical engineer and should be performed during a period of dry weather.



Attempts can first be made to compact the problem soils. If dry weather conditions exist prior to and at the time of construction, re-compaction and densification may prove successful. The soils should be scarified and the soil moisture should be adjusted to within 3 percent of optimum moisture for low plasticity soils. Once proofrolling has been accomplished, then re-compaction of the soils may be attempted. In pavement areas where unsuitable soils are encountered, stabilization using geotextile or geogrid with stone may be a more economical option than removal and replacement of the soils.

4.3 Time of Year Site Preparation Considerations

The time of the year that the sitework begins can affect the project considerably. In this area, the “wet” season is generally between the months of November to April, and the “dry” season from May to October. There are many considerations that need to be addressed prior to bidding a project that could affect the budget based on the time of year a project starts earthwork activities. The time of the year that the geotechnical borings were performed can provide a false sense of actual near surface conditions depending on the time of year and weather conditions. Below are considerations that should be addressed based on the time of the year earthwork is started.

“Wet” Season

During the “wet” season, the amount of undercutting may be greater, therefore resulting in greater excavation costs. The soils are typically proofrolled to determine their suitability for the placement of new fill or subgrade support. During the wet season, the surface soils have a higher moisture content and will tend to pump, therefore, hindering the placement of new fill. In addition, the drying time, time period between rain events, and temperature is not conducive to scarify soils, allow to dry, and recompact. At this time, the decision should be made by the owner to try either scarify/dry/compact the in-place soils, which could take time, or undercut and replace with suitable material, which could increase the sitework costs. Based on our experience, the amount of undercut could be an additional 1 to 2 feet (or greater in localized areas), whereas in drier weather, lesser amounts of undercutting may be necessary, if recompaction or stabilization of soils left in place can be achieved.

Some undercut soils are not always “unsuitable” soil and can be moisture conditioned and reused as fill in the deep areas, if drying conditions are favorable.

“Dry” Season

During the “dry” season, the surface soils have a lower moisture content and will tend to “bridge” or “crust” softer underlying soils. They will generally allow the placement of new fill, but the crust can break down if repeated passes with heavily loaded equipment is persistent. In addition, new fill from cuts or other sources may need to be moisture conditioned prior to compaction. The soils can dry significantly, requiring the addition of water for proper compaction. Water trucks should be used, as necessary, by the contractor to condition the soils within the required specifications.

Contractor Responsibility

The grading contractors have the option of performing their own evaluation of the site conditions to assess the excavation considerations based on the time of year a project is bid. We strongly suggest that the grading contractors conduct their own exploration and evaluation of the site conditions and material management requirements to cost effectively develop the site.

Typically, due to the movement of heavy equipment and weather conditions, the subgrade becomes disturbed during construction. As a result, fine grained clayey soils tend to lose shear strength and support capability.



Therefore, additional effort on the Contractor’s part will be required to reduce traffic and limit disturbance of soils. It is essential that the subgrade be restored to a properly compacted condition based on optimum moisture and density requirements. Restoration of the subgrade should be addressed in the project specifications.

4.4 Fill Placement

Soil Fill Material

Soil fill material in the building area should be placed in loose lifts not exceeding 8-inches in thickness with a maximum particle size of 3 inches. The following table summarizes the compacted fill requirements:

Location	Test Method	Compaction Required (minimum)	Moisture Content
Structural Area and 10’ beyond perimeter	ASTM D698 (standard)	98%	±3 percentage points of optimum moisture
Upper 12-inches below pavements and 5’ beyond the edge of pavement	ASTM D698 (standard)	98%	±3 percentage points of optimum moisture
Pavement Crushed Aggregate Base	ASTM D1557 (modified)	100%	±2 percentage points of optimum moisture
All other areas	ASTM D698 (standard)	95%	±3 percentage points of optimum moisture

Structural fill material should meet the following characteristics:

Property	Requirement
Organic Material	≤ 5%
Liquid Limit	< 50%
Plasticity Index	≤ 30%
Maximum Dry Density	≥ 100 lb/ft ³
Maximum Particle Size	3 inches or less

Plastic clays (CH) that were encountered should not be used as fill in the building or drive areas. Samples of the proposed fill materials, either from on-site or borrow, should be provided to the geotechnical engineer for Proctor testing and evaluation prior to placement. Density tests should be performed to document compaction and moisture content of any earthwork involving soils and other applicable materials. Density tests should be performed frequently, with a recommended minimum of one test per 5,000 square feet per lift of fill in structural areas and one test per 10,000 square feet per lift in other areas. Fill material must meet the specified density and moisture requirements to be considered acceptable.



4.5 Backfilling of Utility Trenches

Backfilling of storm drain and utility trenches must be performed in a controlled manner to reduce settlement of the fill and cracking of overlying floor slabs and pavements. We recommend that utility trenches be backfilled with acceptable borrow or dense-graded crushed stone in 6-inch loose lifts compacted with mechanical piston tampers to the project requirements. Should seepage occur in utility trenches, it may be necessary to “floor” the trench with dense-graded gravel to provide a working surface.

We recommend that within 5 feet of the building’s exterior perimeter, dense graded aggregate (DGA, compacted in lifts) be used. Open-graded crushed stone, such as ALDOT #57, can serve as a channel for seepage toward structures and therefore is not recommended for use as utility trench backfill adjacent to structures.

5.0 STRUCTURAL RECOMMENDATIONS

5.1 Shallow Foundations

Shallow foundations can be used and sized for a net allowable bearing capacity of 2,500 pounds per square foot (psf). The foundations should bear in or on newly placed compacted fill material or in stiff or very stiff naturally occurring soils.

The building should be designed to tolerate movements (up and down) of approximately 1-inch. Control joints should be used in masonry walls to accommodate movement. Such movement may occur due to settlement attributed to foundation load and volume change of plastic clays (CH) with a corresponding change in moisture content.

Exterior foundations should bear at a minimum of 36-inches below exterior adjacent grade. Alternatively, exterior foundations may be excavated a minimum 36-inches and backfilled with lean concrete or controlled low strength material (CLSM) to allow foundations to bear at a shallower depth. Interior foundations should bear at a minimum of 12-inches. All foundation excavations should be thoroughly compacted prior to placement reinforcing and concrete. If concrete placement is not possible immediately after excavation, we recommend that the foundations be over-excavated by a minimum of 2-inches and provide a thin layer (approximately 2-inches) of lean concrete or CLSM be placed on the bearing surface for protection after we have observed and evaluated the exposed bearing surfaces.

Even though computed footing dimensions may be less, column footings and continuous footings should have minimum width dimensions of 24-inches and 18-inches, respectively. This allows for hand cleaning of materials disturbed during the excavation process and reduces the potential for punching shear failure.

Foundation concrete should be placed the same day as footings are excavated so that the foundation bearing soils can remain near the existing moisture content. Foundation bearing surfaces should not be disturbed or left exposed during inclement weather. Saturation of the on-site soils can cause a loss of strength and increased compressibility. If bearing soils dry excessively, they can later well and heave foundations. Excavations for footings should be hand cleaned to remove loose soil or mud and the bearing surface should be thoroughly compacted. If concrete placement is not possible immediately after excavation, we recommend that a thin layer



(approximately 2 inches) of lean concrete or CLSM be placed on the bearing surface for protection after we have observed and evaluated the exposed bearing surfaces.

All foundation excavations should be observed by the geotechnical engineer or his representative. The engineer can provide geotechnical guidance to the owner's design team should any unforeseen foundation problems develop during construction. If the foundation surfaces prove to be unsuitable, the foundation may need to be over-excavated. The over-excavated area can be backfilled with "lean" concrete, controlled low strength material (CLSM), or well-compacted dense graded crushed stone (ALDOT 825B) up to the planned foundation bearing depth.

5.2 Floor Slabs

It is our opinion that floor slabs can be built on-grade achieving support from a minimum of 24-inches of low-plasticity properly compacted fill material compacted to 98 percent of the material's standard Proctor maximum dry density. Ground supported slabs should be supported on a minimum of 4 inches of compacted, granular materials such as crushed stone or a clean sand with less than 10% passing the #200 sieve. This layer should provide uniform and immediate support of the slab and act as a capillary break. A vapor retarder should be used on top of the granular layer, as required by the building use. We recommend a modulus of subgrade reaction of 150 psi/in (pci).

Care should be taken so that fines from the subgrade are not allowed to contaminate the granular layer. If fines do contaminate this layer, capillary rise and subsequent damage to moisture sensitive floor coverings could occur. On most projects, there is some time lag between initial grading and the time when the contractor is ready to place concrete for the slab-on-grade. Inclement weather just prior to placement of concrete for the slab-on-grade can result in trapped water in the granular layer.

5.3 Drainage Considerations

Adequate drainage should be provided at the site to reduce the increase in moisture content of the foundation soils. We recommend that the parking lots, walkways, and the ground surface be sloped away from the structure on all sides. Roof drainage should be collected by gutters and downspouts and transmitted by pipe to the storm water drainage system or discharge a minimum of 5 feet away from the building.

5.4 Lateral Resistance

Lateral loads created by wind may be resisted by the passive pressure of the soil acting against the side of the footing and/or the friction developed between the base of the footing and the underlying soil. For compacted backfill or in-situ residual soil, the passive pressure can be taken as an equivalent to the pressure exerted by a fluid weighing 120 pcf ($\phi = 0^\circ$, moist unit weight of soil = 120 pcf). A coefficient of friction of 0.35 may be used for calculating the frictional resistance at the base of the shallow footings.

The resistance values discussed are based on assumption that the foundations can withstand horizontal movements of up to ¼-inch. In addition, the excavation of the footing walls should be near vertical and the concrete placed directly against the soil. The passive pressure will be reduced if the loaded side is benched or sloped. Lateral resistance determined in accordance with these recommendations should be considered the total available resistance. The design should include a minimum factor of safety of 1.5.



5.5 Seismic Site Classification

Subsurface information (SPT and soil classification) from the borings, published geologic information, and our experience were used to estimate the seismic site classification according to methods in the 2021 International Building Code. Based upon this information, we recommend a Seismic Site Class of D (Stiff Soil) for this site.

Based on our understanding of the project, we have assumed a Risk Category of IV. If the Risk Category is different, the values below may need to be revised. According to the ASCE 7/SEI 7-16 hazard standard information, the following values have been calculated for this site.

Type	Value	Description
S_s	0.263	MCE_R ground motion (for 0.2 second period)
S_1	0.099	MCE_R ground motion (for 1.0s period)
S_{DS}	0.279	Numeric seismic design value at 0.2 second SA
S_{D1}	0.158	Numeric seismic design value at 1.0 second SA
F_a	1.59	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second

6.0 PAVEMENTS

6.1 General

We understand that typical traffic will include fire trucks and emergency personnel vehicles in the high bay areas and drives and automobiles in the parking areas. At this time, the actual traffic volumes or vehicular weights have not been provided. We have provided minimum light duty and heavy-duty pavement designs. The pavement designs are based on the minimum pavement section typically required for this type of construction. A CBR value of 5 was used in the design of the pavement sections in the following sections. A modulus of subgrade reaction of 150pci should be available for the subgrade soils if prepared as recommended in this report.

6.2 Subgrade

Site grading should be directed toward providing **at least 12-inches of select compacted fill or stiff low-plasticity soil** below the pavement subgrade as outlined in Section 4.2.

Typically, during construction, the pavement subgrade becomes disturbed because of traffic and environmental conditions. Prior to construction of pavements, it is essential that the subgrade be restored to a properly compacted condition. The specifications should include notes pertaining to subgrade restoration immediately prior to pavement construction. The on-site clayey soils will tend to lose shear strength (and consequently pavement support capability) if they are exposed to excessive moisture. Thus, proper moisture conditioning of the subgrade prior to placement of the pavement base course will result in better pavement performance.

The pavement subgrades should be thoroughly proofrolled prior to fine grading to identify soft soils not encountered during the mass grading of the site. Those soft areas should be undercut and replaced with properly compacted fill.



6.3 Rigid Pavement

All Portland cement concrete pavements should contain 4 to 6 percent entrained air assuming the mix will contain ¾ -inch to 1-inch nominal maximum size aggregate. Concrete slump should be no more than 2 inches when placed by slip forming and no more than 4 inches for non-slip formed concrete. Minimum 28-day concrete compressive strength should be 4,000 psi and minimum flexural strength 650 psi.

RIGID PAVEMENT MINIMUM THICKNESS (INCHES)		
Pavement Materials	Light Duty	Heavy Duty
Portland Cement Concrete	6.0	8.0
Crushed Aggregate Base Course (ALDOT 825 Type B) (100% Modified)	6.0	6.0

Pavement joints, reinforcing, and details should be designed in accordance with the applicable American Concrete Institute (ACI) standards. Portland cement concrete pavement should meet the requirements of ALDOT Section 450.

6.4 Flexible Pavement

The typical minimum flexible pavement sections should include the following:

Pavement Area	Minimum Section Thickness	Pavement Materials
Standard Duty Pavements	1.0 inch	ALDOT Section 424A Superpave Bituminous Wearing Surface
	2.0 inches	ALDOT Section 424B Superpave Bituminous Binder Layer
	6.0 inches	ALDOT Section 825 Type B, Dense Graded Aggregate Base (98% Modified)
Heavy Duty Pavements	1.5 inches	Asphaltic Concrete 424A Superpave Bituminous Wearing Surface
	4.0 inches	Asphaltic Concrete 424B Superpave Bituminous Binder Layer
	8.0 inches	ALDOT Section 825 Type B, Dense Graded Aggregate Base (100% Modified)

A prime coat (ALDOT Section 401) should be placed on the dense graded aggregate prior to bituminous binder layer placement. A tack coat (ALDOT Section 405) should be placed between bituminous pavement layers. The pavement sections represent minimum recommended thickness for a pavement section designed for a 15-year life. However, periodic maintenance should be anticipated over the pavement design life. All pavement materials and construction procedures should conform to the *State of Alabama Department of Transportation Standard Specifications for Highway Construction, Latest Edition*. The hot-mix asphalt should conform to Section 424.



7.0 REPORT LIMITATIONS

The recommendations submitted are based on the available soil information obtained by GMC and design details furnished by GMC for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, we should be notified immediately to determine if changes in the foundation or other recommendations are required. If GMC is not retained to perform these functions, GMC cannot be responsible for the impact of those conditions on the performance of the project.

The findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents.

We emphasize that this report was prepared for design and informational purposes only and may not be sufficient to prepare an accurate construction budget. Contractors reviewing this report should acknowledge that the recommendations contained herein are for design and informational purposes only. In no case should this report be utilized as a substitute for development of specific earthwork specifications.

The information contained in this report is not intended, nor is sufficient, to aid in the design of segmental or mechanically stabilized earth (MSE) retaining walls. Segmental or MSE wall designers and builders should not rely on this report and should perform independent analysis to determine all necessary soil characteristics for use in their wall design, including but not limited to, soil shear strengths, bearing capacities, global stability, etc.



APPENDIX

Site Location Map

Site Geology Map

USGS Site Map

Boring Location Plan

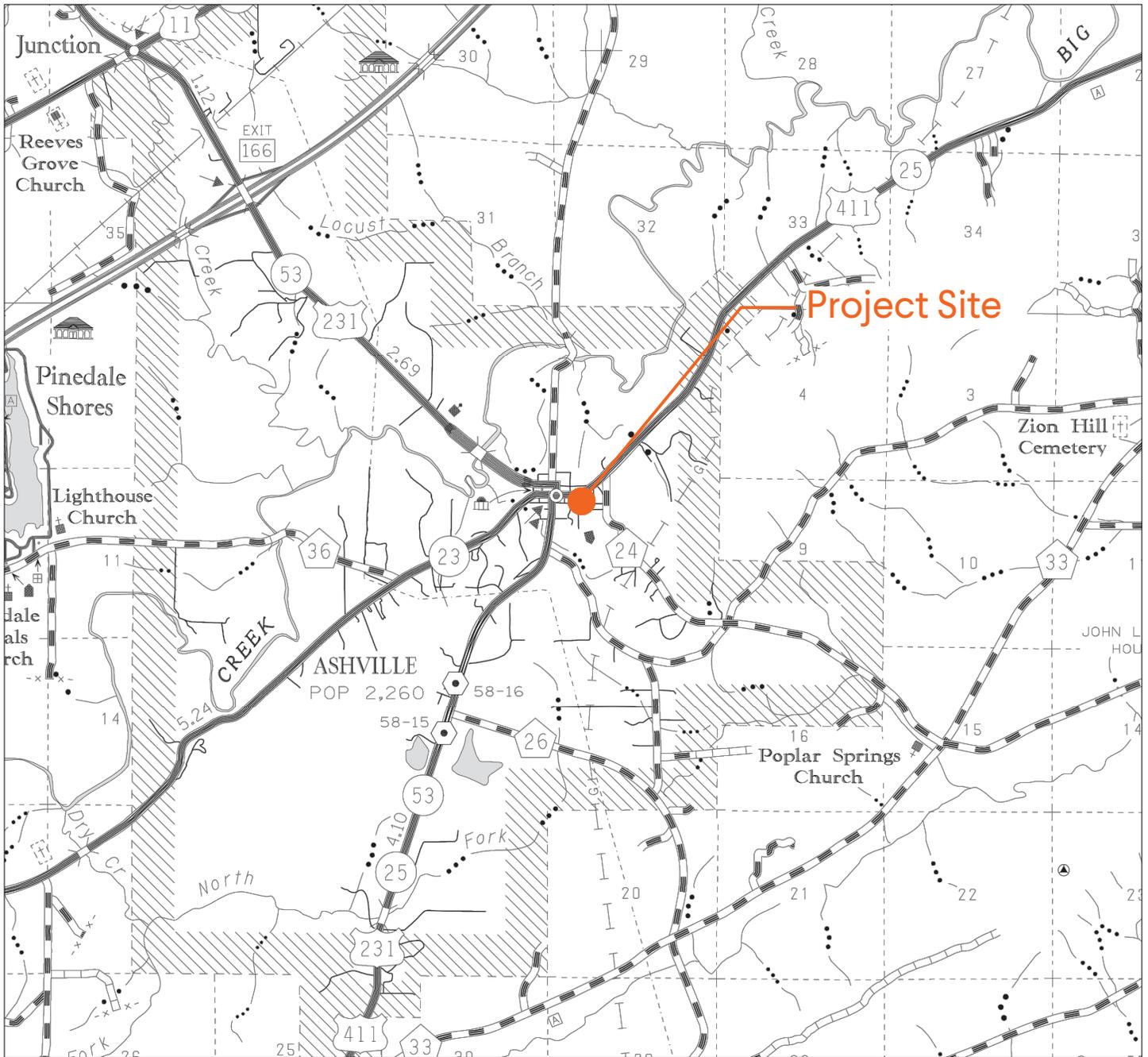
Soil Classification Chart

Subsurface Diagrams

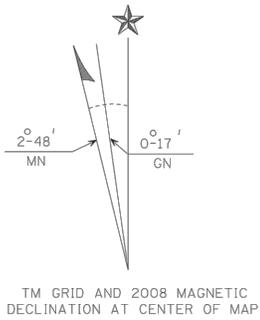
Boring Records

Summary of Laboratory Results

Field and Laboratory Procedures



Project Site



Reference: General Highway Map of Saint Clair County, ALDOT, 2008

Ashville Fire Station
 Ashville, Alabama

Site Location Map

Figure 1

SUPPLEMENTAL DRAWING

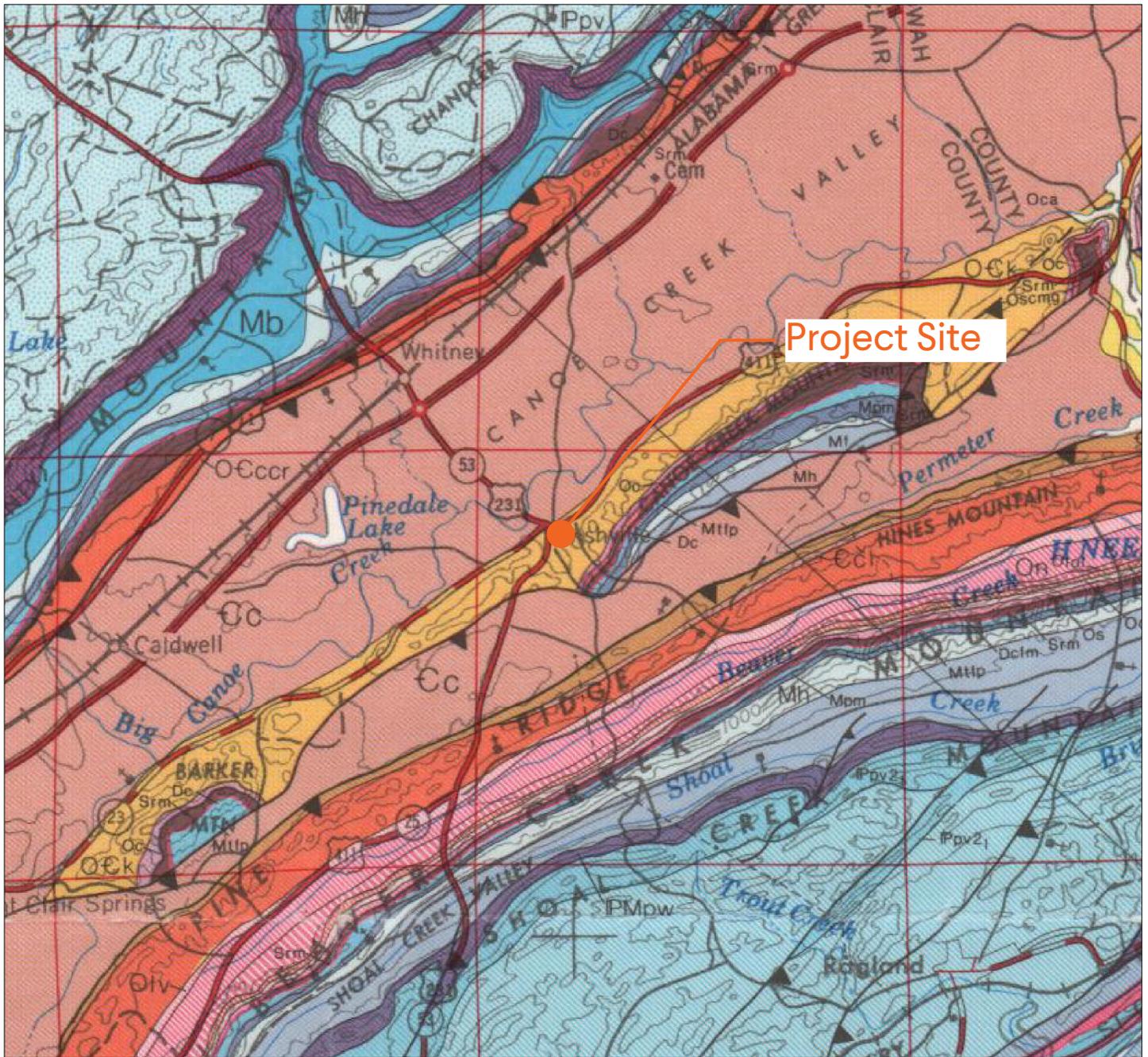
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- Ock Knox Group Undifferentiated in part
- Cc Conasauga Formation

Reference: Szabo, M.W., Osborne, E.W., Copeland, C.W. Jr., and Neathery, T.L., 1988, Geologic Map of Alabama, Geological Survey of Alabama Special Map 220

Ashville Fire Station
Ashville, Alabama

Figure 2

SUPPLEMENTAL DRAWING

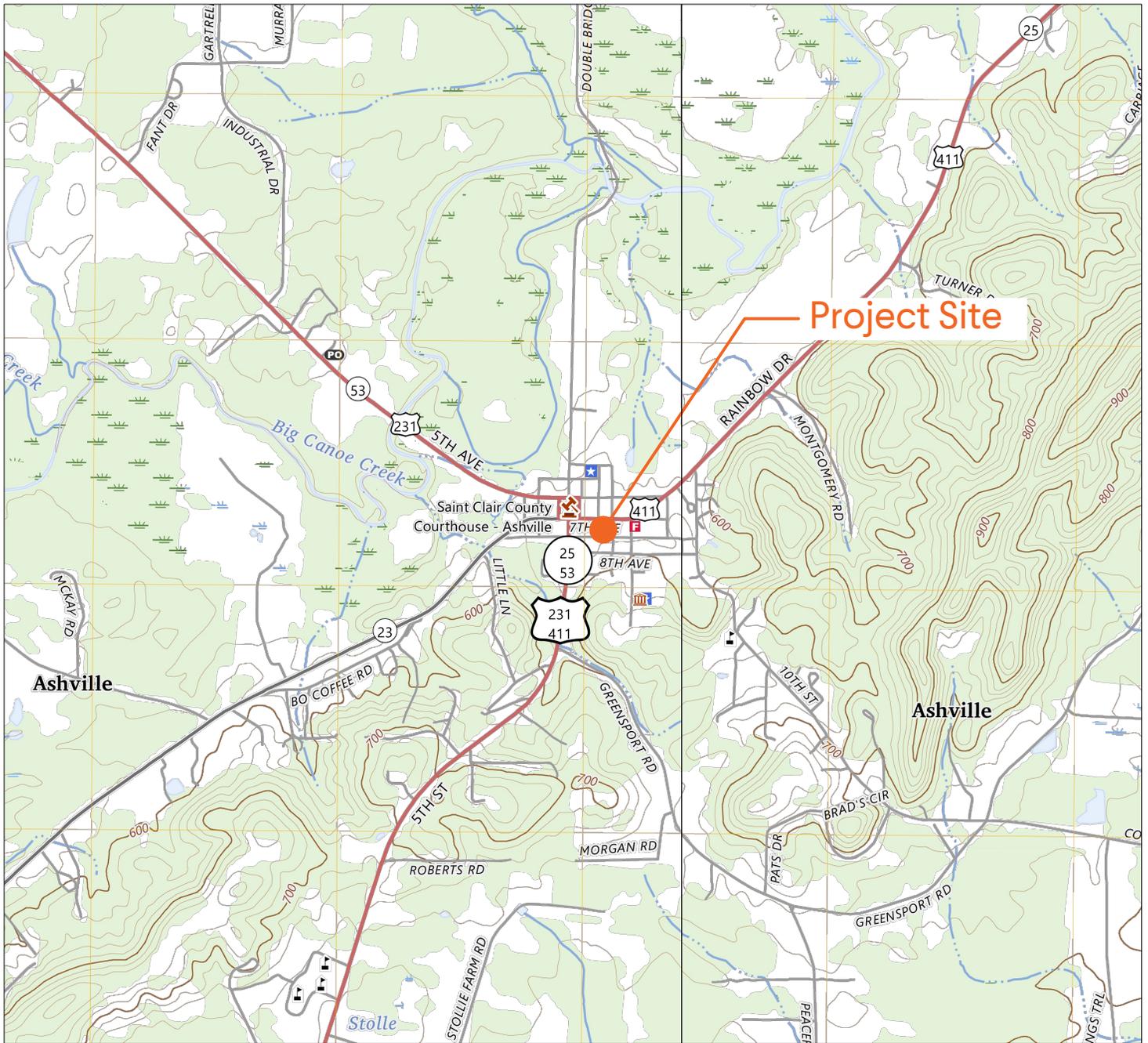
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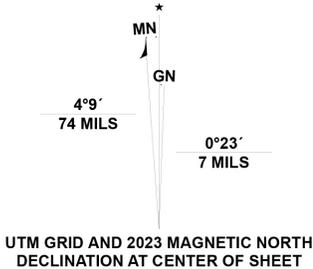


Project Site

Ashville

Ashville

Stolle



Reference: USGS Quadrangles 7.5 Minute Series (Topographic)

Ashville Fire Station
Ashville, Alabama

Figure 3

SUPPLEMENTAL DRAWING
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Ashville, AL (2024) | Cox Gap (2024)
USGS Site Map



 Approximate Boring Location



Reference: Google Earth Imagery Data (01/18/23)

Ashville Fire Station
Ashville, Alabama

Figure 4

SUPPLEMENTAL DRAWING

GMC # GHUN250014

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GMC

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES	
	FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50				MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
				CH	INORGANIC CLAYS OF HIGH PLASTICITY	
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

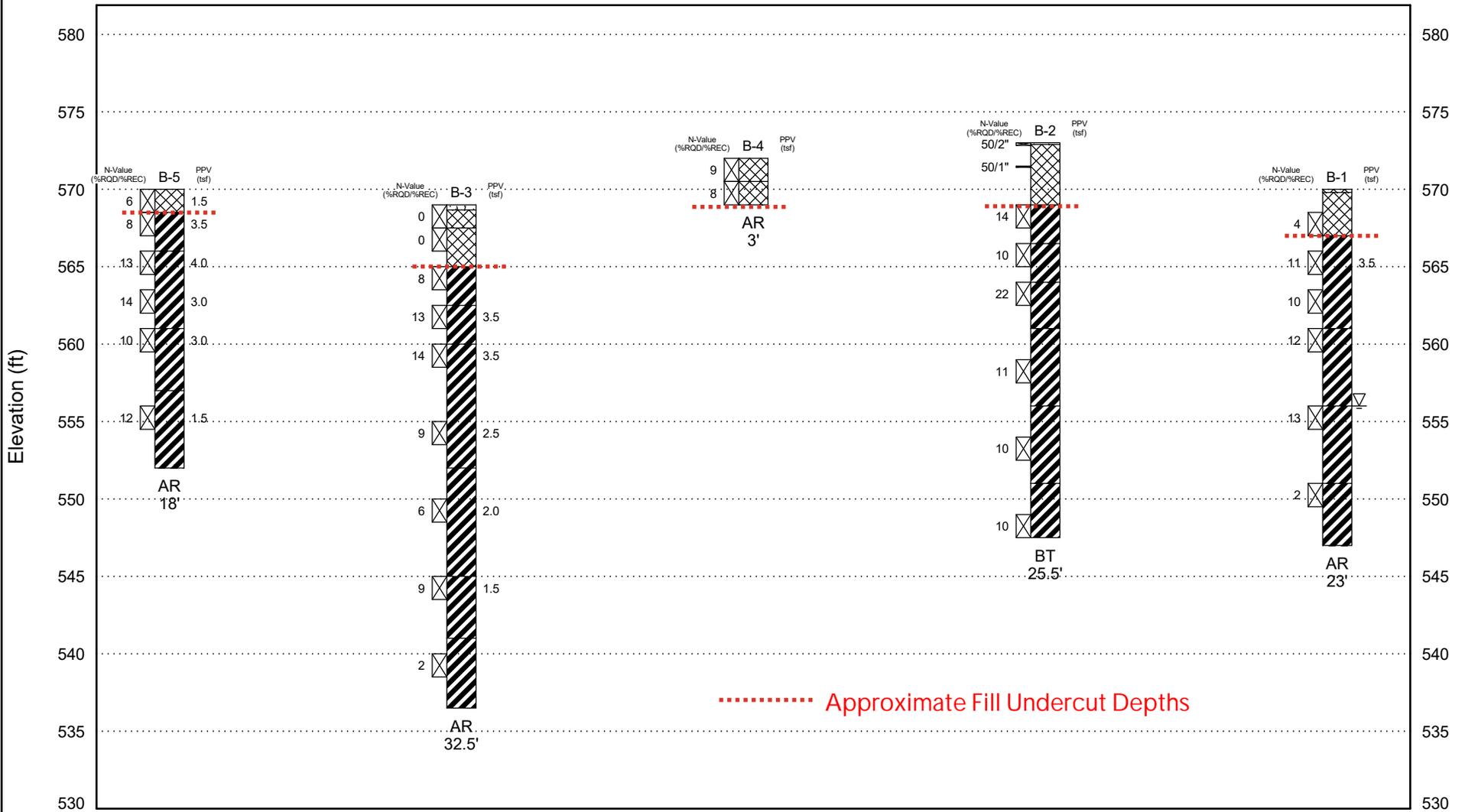
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

CLIENT City of Ashville

PROJECT NAME Ashville Fire Station

PROJECT NUMBER GHUN250014

PROJECT LOCATION Ashville, AL



BT-AR DEPTH LOG - GHUN250014 ASHVILLE FIRE STATION.GPJ GMC DATA TEMPLATE.GDT 8/6/25

BT - Boring Termination
AR - Auger Refusal

Distance Along Baseline (ft)



SUBSURFACE DIAGRAM Building & Drives



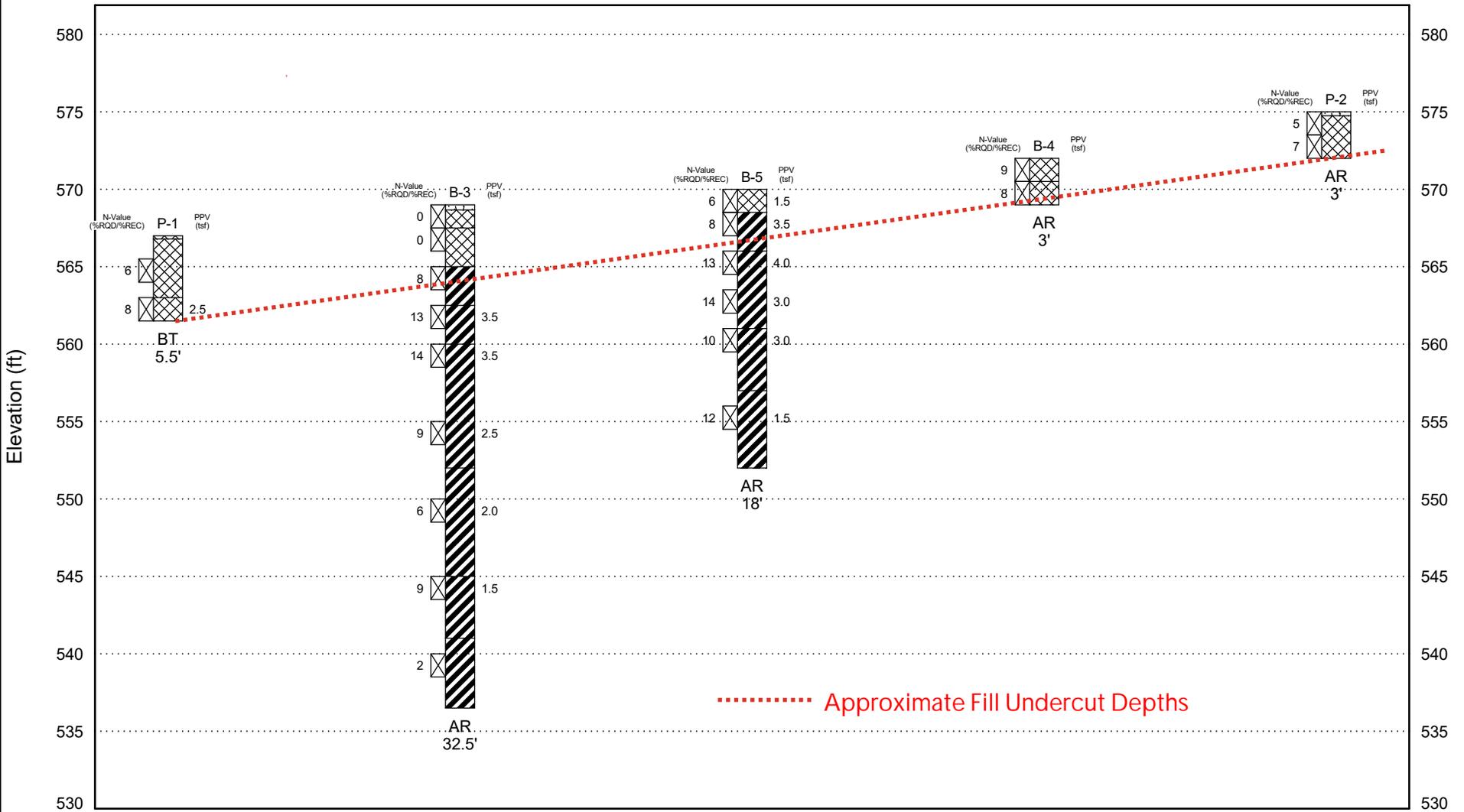
CLIENT City of Ashville

PROJECT NAME Ashville Fire Station

PROJECT NUMBER GHUN250014

PROJECT LOCATION Ashville, AL

BT-AR DEPTH LOG - GHUN250014 ASHVILLE FIRE STATION.GPJ - GMC DATA TEMPLATE.GDT - 8/6/25



BT - Boring Termination
AR - Auger Refusal

Distance Along Baseline (ft)



CLIENT City of Ashville **PROJECT NAME** Ashville Fire Station
PROJECT NUMBER GHUN250014 **PROJECT LOCATION** Ashville, AL
DATE STARTED 6/19/25 **COMPLETED** 6/19/25 **GROUND ELEVATION** 570 ft **HOLE SIZE** 4.5"
DRILLING CONTRACTOR Earth Core, LLC **GROUND WATER LEVELS:**
DRILLING METHOD Geoprobe 7822DT, Auto-Hammer, HSA w/ SPT **∇ AT TIME OF DRILLING** 14.00 ft / Elev 556.00 ft
LOGGED BY D. Gamlin **CHECKED BY** K. Wales **AT END OF DRILLING** ---
NOTES _____ **AFTER DRILLING** ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
570	0		Gravel, 2"										
			SANDY LEAN CLAY (CL), light brown, reddish brown, soft - FILL	SS		2-2-2 (4)			20	34	15	19	70
			FAT CLAY with SAND (CH), reddish brown, gray, stiff										
565	5			SS		4-5-6 (11)	3.5		28				
				SS		4-5-5 (10)			33				
560	10		SANDY FAT CLAY (CH), reddish brown, gray, stiff	SS		5-5-7 (12)			43				
555	15		FAT CLAY (CH), light brown, brown, very pale brown, stiff - MOIST	SS		5-6-7 (13)			42				
550	20		FAT CLAY (CH), brown, very soft	SS		1-1-1 (2)			48				
			Auger refusal was encountered at 23.0 feet.										
545	25												
540	30												
535	35												

1.GMC BORINGS GHUN250014 ASHVILLE FIRE STATION.GPJ GMC DATA TEMPLATE.GDT 8/6/25



CLIENT City of Ashville **PROJECT NAME** Ashville Fire Station
PROJECT NUMBER GHUN250014 **PROJECT LOCATION** Ashville, AL
DATE STARTED 6/19/25 **COMPLETED** 6/19/25 **GROUND ELEVATION** 573 ft **HOLE SIZE** 4.5"
DRILLING CONTRACTOR Earth Core, LLC **GROUND WATER LEVELS:**
DRILLING METHOD Geoprobe 7822DT, Auto-Hammer, HSA w/ SPT **AT TIME OF DRILLING** None Encountered
LOGGED BY D. Gamlin **CHECKED BY** K. Wales **AT END OF DRILLING** --
NOTES _____ **AFTER DRILLING** --

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
570	0		Organic Laden Material (OLM), 1" FAT CLAY (CH), black, hard - w/ heavy organics - FILL	SS		50/2"			25				
570				SS		50/1"							
565	5		FAT CLAY (CH), brown, reddish brown, stiff	SS		4-6-8 (14)			29				
565			FAT CLAY with SAND (CH), brown, reddish brown, stiff	SS		4-5-5 (10)			29				
560	10		SANDY FAT CLAY (CH), brown, very stiff	SS		8-10-12 (22)			32				
560			SANDY FAT CLAY (CH), reddish brown, stiff										
555	15		SANDY FAT CLAY with GRAVEL (CH), reddish brown, stiff	SS		5-5-6 (11)			35				
555													
550	20		FAT CLAY (CH), reddish brown, stiff	SS		4-5-5 (10)			39				
550													
545	25		Boring was terminated at 25.5 feet.	SS		4-4-6 (10)			43				
545													
540	30												
540													
540	35												

1.GMC BORINGS GHUN250014 ASHVILLE FIRE STATION.GPJ GMC DATA TEMPLATE.GDT 8/6/25



CLIENT City of Ashville
PROJECT NAME Ashville Fire Station
PROJECT NUMBER GHUN250014
PROJECT LOCATION Ashville, AL
DATE STARTED 6/19/25 **COMPLETED** 6/19/25
GROUND ELEVATION 569 ft **HOLE SIZE** 4.5"
DRILLING CONTRACTOR Earth Core, LLC
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe 7822DT, Auto-Hammer, HSA w/ SPT
AT TIME OF DRILLING None Encountered
LOGGED BY D. Gamlin **CHECKED BY** K. Wales
AT END OF DRILLING ---
NOTES _____
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0		Organic Laden Material (OLM), 4"	X SS		1-0-0 (0)			32				
			FAT CLAY (CH), very dark brown, very soft - w/ heavy organics - FILL	X SS		0-0-0 (0)			23				
			FAT CLAY (CH), brown, very soft - VERY SATURATED - FILL										
565	5		SANDY FAT CLAY (CH), light brown, medium	X SS		3-4-4 (8)			15				
			FAT CLAY with SAND (CH), red, reddish brown, stiff	X SS		5-6-7 (13)	3.5		27				
560	10		FAT CLAY (CH), red, reddish brown, stiff	X SS		4-6-8 (14)	3.5		29				
555	15			X SS		4-5-4 (9)	2.5		35				
			FAT CLAY (CH), reddish brown, brown, medium										
550	20			X SS		3-3-3 (6)	2.0		35				
545	25		FAT CLAY (CH), brown, stiff	X SS		3-4-5 (9)	1.5		33				
540	30		FAT CLAY (CH), brown, very soft - MOIST	X SS		1-1-1 (2)			44				
535	35		Auger refusal was encountered at 32.5 feet.										

1.GMC BORINGS GHUN250014 ASHVILLE FIRE STATION.GPJ GMC DATA TEMPLATE.GDT 8/6/25



CLIENT City of Ashville **PROJECT NAME** Ashville Fire Station
PROJECT NUMBER GHUN250014 **PROJECT LOCATION** Ashville, AL
DATE STARTED 6/19/25 **COMPLETED** 6/19/25 **GROUND ELEVATION** 570 ft **HOLE SIZE** 4.5"
DRILLING CONTRACTOR Earth Core, LLC **GROUND WATER LEVELS:**
DRILLING METHOD Geoprobe 7822DT, Auto-Hammer, HSA w/ SPT **AT TIME OF DRILLING** None Encountered
LOGGED BY D. Gamlin **CHECKED BY** K. Wales **AT END OF DRILLING** --
NOTES _____ **AFTER DRILLING** --

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
570	0		CLAYEY SAND (SC), brown, loose - FILL	SS		4-3-3 (6)	1.5		16	33	16	17	40
			FAT CLAY (CH), reddish brown, red, medium	SS		2-4-4 (8)	3.5		28				
565	5		FAT CLAY (CH), red, reddish brown, stiff	SS		5-6-7 (13)	4.0		29				
				SS		4-6-8 (14)	3.0		31				
560	10		SANDY FAT CLAY (CH), red, reddish brown, stiff	SS		4-5-5 (10)	3.0		33				
			SANDY FAT CLAY (CH), pale brown, stiff										
555	15			SS		5-6-6 (12)	1.5		35				
550	20		Auger refusal was encountered at 18.0 feet.										
545	25												
540	30												
535	35												

1.GMC BORINGS GHUN250014 ASHVILLE FIRE STATION.GPJ GMC DATA TEMPLATE.GDT 8/6/25



CLIENT City of Ashville **PROJECT NAME** Ashville Fire Station
PROJECT NUMBER GHUN250014 **PROJECT LOCATION** Ashville, AL
DATE STARTED 6/19/25 **COMPLETED** 6/19/25 **GROUND ELEVATION** 567 ft **HOLE SIZE** 4.5"
DRILLING CONTRACTOR Earth Core, LLC **GROUND WATER LEVELS:**
DRILLING METHOD Geoprobe 7822DT, Auto-Hammer, HSA w/ SPT **AT TIME OF DRILLING** None Encountered
LOGGED BY D. Gamlin **CHECKED BY** K. Wales **AT END OF DRILLING** ---
NOTES _____ **AFTER DRILLING** ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
565	0		Gravel, 2" SANDY FAT CLAY (CH), grayish brown, medium - FILL	SS		2-3-3 (6)			13				
560	5		SANDY FAT CLAY (CH), brown, medium- FILL	SS		3-3-5 (8)	2.5		17				
			Boring was terminated at 5.5 feet.										
555	10												
550	15												
545	20												
540	25												
535	30												
	35												

1.GMC BORINGS GHUN250014 ASHVILLE FIRE STATION.GPJ GMC DATA TEMPLATE.GDT 8/6/25



CLIENT City of Ashville **PROJECT NAME** Ashville Fire Station
PROJECT NUMBER GHUN250014 **PROJECT LOCATION** Ashville, AL
DATE STARTED 6/19/25 **COMPLETED** 6/19/25 **GROUND ELEVATION** 575 ft **HOLE SIZE** 4.5"
DRILLING CONTRACTOR Earth Core, LLC **GROUND WATER LEVELS:**
DRILLING METHOD Geoprobe 7822DT, Auto-Hammer, HSA w/ SPT **AT TIME OF DRILLING** None Encountered
LOGGED BY D. Gamlin **CHECKED BY** K. Wales **AT END OF DRILLING** ---
NOTES _____ **AFTER DRILLING** ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
575	0		Organic Laden Material (OLM), 3"	SS		2-2-3 (5)			16				
			LEAN CLAY with SAND (CL), brown, medium - MOIST - FILL	SS		2-3-4 (7)			15				
			Auger refusal was encountered at 3.0 feet.										
570	5												
565	10												
560	15												
555	20												
550	25												
545	30												
540	35												

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SUMMARY OF LABORATORY RESULTS

CLIENT City of Ashville

PROJECT NAME Ashville Fire Station

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Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Max. Sieve Size Tested (mm)	%<#200 Sieve	Natural Moisture (%)	Classification	Opt. Moisture Content (%)	Max Dry Density (pcf)	Specific Gravity
B-1	1.5-3	34	15	19	4.75	70	20.2	CL			
B-1	4-5.5						28.4				
B-1	6.5-8						32.9				
B-1	9-10.5						43.5				
B-1	14-15.5						41.8				
B-1	19-20.5						48.4				
B-2	0-1.5						25.4				
B-2	4-5.5						29.2				
B-2	6.5-8						29.1				
B-2	9-10.5						31.7				
B-2	14-15.5						34.8				
B-2	19-20.5						39.0				
B-2	24-25.5						42.9				
B-3	0-1.5						32.4				
B-3	1.5-3						22.5				
B-3	4-5.5						14.9				
B-3	6.5-8						27.4				
B-3	9-10.5						29.0				
B-3	14-15.5						34.8				
B-3	19-20.5						34.6				
B-3	24-25.5						32.9				
B-3	29-30.5						43.6				
B-4	0-1.5						16.6				
B-4	1.5-3	22	15	7	4.75	63	15.0	CL-ML			
B-5	0-1.5	33	16	17	25	40	15.6	SC			
B-5	1.5-3						27.5				
B-5	4-5.5						29.4				
B-5	6.5-8						31.0				
B-5	9-10.5						33.2				
B-5	14-15.5						34.7				
P-1	1.5-3						12.9				
P-1	4-5.5						16.8				
P-2	0-1.5						15.9				
P-2	1.5-3						14.9				



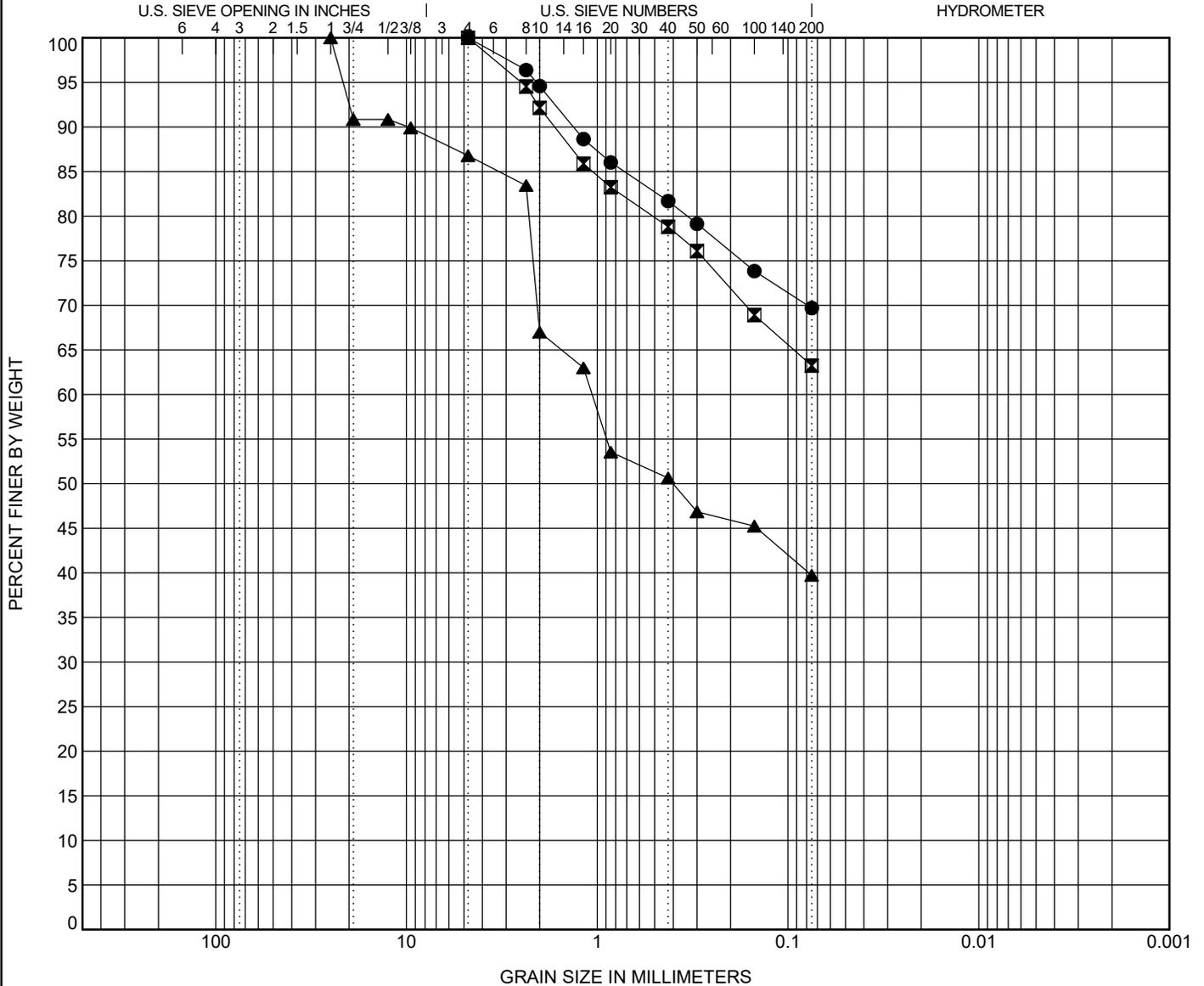
GRAIN SIZE DISTRIBUTION

CLIENT City of Ashville

PROJECT NAME Ashville Fire Station

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PROJECT LOCATION Ashville, AL



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification			LL	PL	PI	Cc	Cu
●	B-1	1.5-3.0	SANDY LEAN CLAY(CL)			34	15	19		
▣	B-4	1.5-3.0	SANDY SILTY CLAY(CL-ML)			22	15	7		
▲	B-5	0.0-1.5	CLAYEY SAND(SC)			33	16	17		
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	1.5-3.0	4.75				0.0	30.3	69.7	
▣	B-4	1.5-3.0	4.75				0.0	36.8	63.2	
▲	B-5	0.0-1.5	25	1.064			13.2	47.1	39.7	



FIELD TEST PROCEDURES

General

The general field procedures employed by Goodwyn Mills Cawood, LLC (GMC), are summarized in the American Society for Testing and Materials (ASTM) Standard D420 which is entitled "Investigating and Sampling Soil and Rock". This recommended practice lists recognized methods for determining soil and rock distribution and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

The detailed collection methods used during this exploration are presented in the following paragraphs.

Standard Drilling Techniques

General: To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. These techniques are as follows:

In Soils:

- a) Continuous hollow stem augers.
- b) Rotary borings using roller cone bits or drag bits, and water or drilling mud to flush the hole.
- c) "Hand" augers.

In Rock:

- a) Core drilling with diamond-faced, double or triple tube core barrels.
- b) Core boring with roller cone bits.

Hollow Stem Auger: A hollow stem auger consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Rotary Borings: Rotary drilling involves the use of roller cone or drag type drill bits attached to the end of drill rods. A flushing medium, normally water or bentonite slurry, is pumped through the rods to clear the cuttings from the bit face and flush them to the surface. Casing is sometimes set behind the advancing bit to prevent the hole from collapsing and to restrict the penetration of the drilling fluid into the surrounding soils. Cuttings returned to the surface by the drilling fluid are typically collected in a settling tank, to allow the fluid to be recirculated.

Hand Auger Boring: Hand auger borings are advanced by manually twisting a 4" diameter steel bucket auger into the ground and withdrawing it when filled to observe the sample collected. Posthole diggers are sometimes used in lieu of augers to obtain shallow soil samples. Occasionally these hand auger borings are used for driving 3-inch diameter steel tubes to obtain intact soil samples.

Dual-Mass Dynamic Cone Penetrometer: Dual-Mass Dynamic Cone Penetrometer tests (DM-DCP) test is intended to provide data that can be correlated to an in situ California Bearing Ratio test. A 0.79-inch O.D. cone is seated at the test location and driven with a 17.6-pound (or 10.1-pound) weight falling 22.6 inches. The length of penetration is recorded with a given number of blows. The values are then evaluated and correlated with an in situ CBR.

Dynamic Cone Penetrometer: Dynamic Cone Penetrometer tests (DCP) is intended to provide data that can be correlated to the standard penetration test (SPT). A 1.5 inch O.D. cone is seated to penetrate any loose cuttings, then driven three, 1-3/4" increments with blows from a 15-pound weight falling 20 inches. The average number of blows required to drive the cone three increments is an index to soil strength and compressibility.



Core Drilling: Soil drilling methods are not normally capable of penetrating through hard cemented soil, weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound, continuous rock. Material that cannot be penetrated by auger or rotary soil-drilling methods at a reasonable rate is designated as “refusal material”. Core drilling procedures are required to penetrate and sample refusal materials.

Prior to coring, casing may be set in the drilled hole through the overburden soils, to keep the hole from caving and to prevent excessive water loss. The refusal materials are then cored according to ASTM D2113 using a diamond studded bit fastened to the end of a hollow, double or triple tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovery is measured, and the core is placed, in sequence, in boxes for storage and transported to our laboratory.

Sampling and Testing in Boreholes

General: Several techniques are used to obtain samples and data in soils; however, the most common methods in this area are:

- a) Standard Penetrating Testing
- b) Water Level Readings

These procedures are presented below. Any additional testing techniques employed during this exploration are contained in other sections of the Appendix.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples obtained with a standard 2-inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140-pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the “penetration resistance” or “N” value, in blows per foot (bpf). The split barrel sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split barrel sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Records. Split barrel samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water table readings are normally taken in the borings and are recorded on the Boring Records. In sandy soils, these readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water table through short-term water level readings. Also, fluctuation in the water table should be expected with variations in precipitation, surface runoff, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers. The water levels reported on the Boring Records are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater table, which may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone. The cave-in depth is measured and recorded on the Boring Records.



Boring Records

The subsurface conditions encountered during drilling are reported on a field boring record prepared by the Driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of ground water. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed, a geotechnical professional classifies the soil samples and prepares the final Boring Records, which are the basis for all evaluations and recommendations. The following terms are taken from ASTM D2487 or Deere's Technical Description of Rock Cores for Engineering Purposes, Rock Mechanical Engineering Geology 1, pp. 18-22.

Relative Density of Cohesionless Soils From Standard Penetration Test		Consistency of Cohesive Soils	
Very Loose	≤ 4 bpf	Very Soft	≤ 2 bpf
Loose	5 - 10 bpf	Soft	3 - 4 bpf
Medium	11 - 30 bpf	Medium	5 - 8 bpf
Dense	31 - 50 bpf	Stiff	9 - 15 bpf
Very Dense	> 50 bpf	Very Stiff	16 - 30 bpf
(bpf = blows per foot, ASTM D 1586)		Hard	> 30 bpf
Relative Hardness of Rock		Particle Size Identification	
Very Soft Rock disintegrates or easily compresses to touch; can be hard to very hard soil.		Boulders	Larger than 12"
Soft Rock may be broken with fingers.		Cobbles	3" - 12"
Moderately Soft Rock may be scratched with a nail, corners and edges may be broken with fingers.		Gravel	
		Coarse	3/4" - 3"
		Fine	4.76mm - 3/4"
Moderately Hard Rock a light blow of hammer is required to break samples.		Sand	
		Coarse	2.0 - 4.76 mm
		Medium	0.42 - 2.00 mm
		Fine	0.42 - 0.074 mm
Hard Rock a hard blow of hammer is required to break sample.		Fines (Silt or Clay)	Smaller than 0.074 mm
Rock Continuity		Relative Quality of Rocks	
RECOVERY = $\frac{\text{Total Length of Core}}{\text{Length of Core Run}} \times 100 \%$		RQD = $\frac{\text{Total core, counting only pieces } > 4" \text{ long}}{\text{Length of Core Run}} \times 100 \%$	
<u>Description</u>	<u>Core Recovery %</u>	<u>Description</u>	<u>RQD %</u>
Incompetent	Less than 40	Very Poor	0 - 25 %
Competent	40 - 70	Poor	25 - 50 %
Fairly Continuous	71 - 90	Fair	50 - 75 %
Continuous	91 - 100	Good	75 - 90 %
		Excellent	90 - 100 %



LABORATORY TESTING

GENERAL

The laboratory testing procedures employed by Goodwyn Mills Cawood, LLC (GMC) are in general accordance with ASTM standard methods and other applicable specifications. Several test methods, described together with others in this Appendix, were used during the course of this exploration. The Laboratory Data Summary sheet indicates the specific tests performed.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Boring Records".

The classification system discussed above is primarily qualitative and for detailed soil classification, two laboratory tests are commonly performed: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

POCKET PENETROMETER TEST

A pocket penetrometer test is performed by pressing the tip of a small, spring-loaded penetrometer with even pressure to a prescribed depth into a soil sample. This test yields a value for unconfined compressive strength, which may be correlated with unconfined compressive strengths obtained by other laboratory methods.

MOISTURE CONTENT

Moisture contents are determined from representative portions of the specimen. The soil is dried to a constant weight in an oven at 100° C and the loss of moisture during the drying process is measured. From this data, the moisture content is computed.

ATTERBERG LIMITS

Liquid Limit (LL), Plastic Limit (PL) and Shrinkage Limit (SL) tests are performed to aid in the classification of soils and to determine the plasticity and volume change characteristics of the materials. The Liquid Limit is the minimum moisture content at which a soil will flow as a heavy viscous fluid. The Plastic Limit is the minimum moisture content at which the soil behaves as a plastic material. The Shrinkage Limit is the moisture content below which no further volume change will take place with continued drying. The Plasticity Index (PI) is the numeric difference of Liquid Limit and Plastic Limit and indicates the range of moisture content over which a soil remains plastic. These tests are performed in accordance with ASTM D4318, D4943 and D427.

PARTICLE SIZE DISTRIBUTION

The distribution of soils coarser than the No. 200 (75-mm) sieve is determined by passing a representative specimen through a standard set of nested sieves. The weight of material retained on each sieve is determined and the percentage retained (or passing) is calculated.

A specimen may be washed through only the No. 200 sieve, if the full range of particle sizes is not required. The percentage of material passing the No. 200 sieve is reported.



The distribution of materials finer than the No. 200 sieve is determined by use of a hydrometer. The particle sizes and distribution are computed from the time rate of settlement of the different size particles while suspended in water. These tests are performed in accordance with ASTM D421, D422 and D1140.